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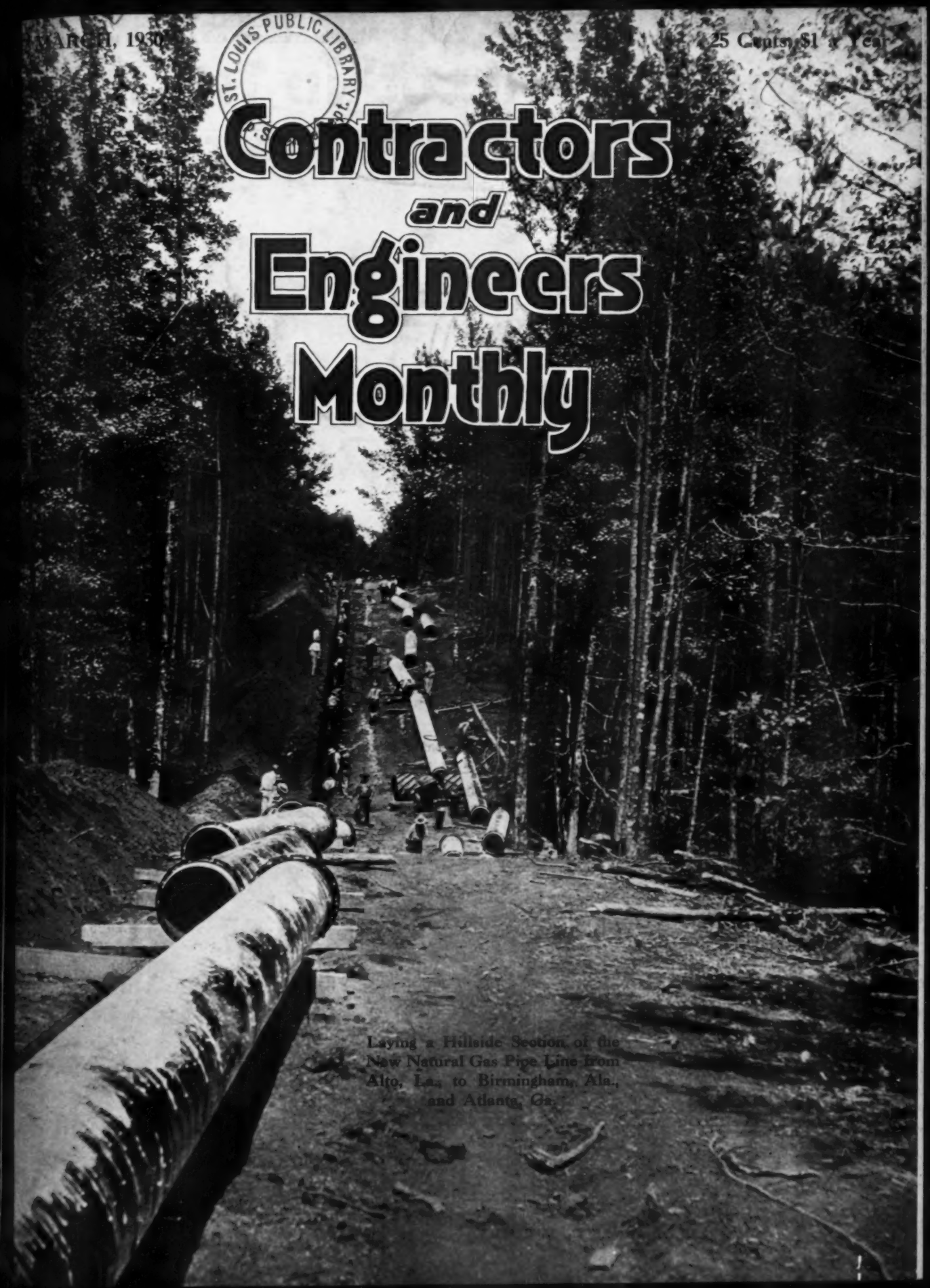
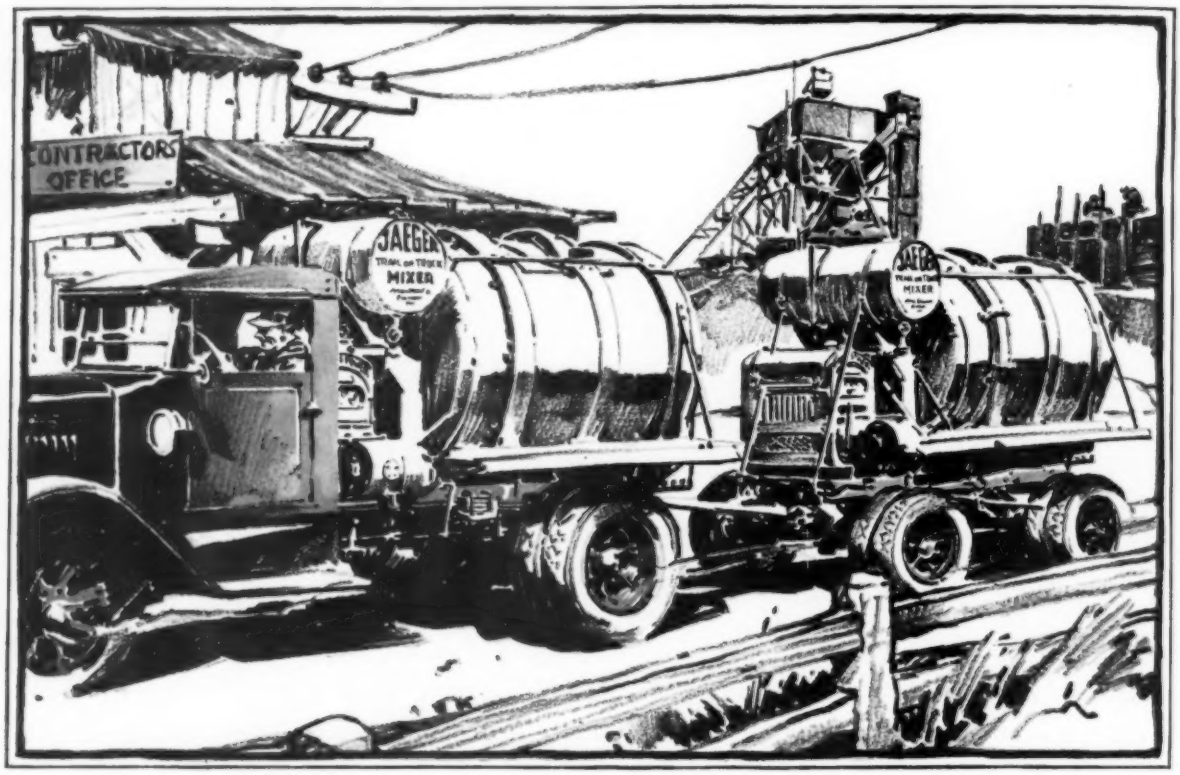


Laying a Hillside Section of the New Natural Gas Pipe Line from Alto, La., to Birmingham, Ala., and Atlanta, Ga.

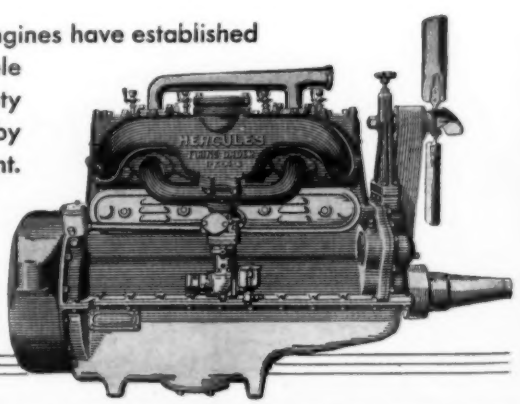
Concrete Mixed in Transit



by Hercules Engines

Mixing 5 yards of material enroute from the batcher to the job, Hercules-Powered Jaeger Trail or Truck Mixers enable contractors to rush concrete construction work and cut down expenses. On short hauls —even with a dry mix—the reliable Hercules Engines respond unfailingly with the added punch and power needed to speed up the drums and insure thoroughly mixed batches.

On all types of industrial machinery, Hercules Engines have established a reputation for reliability and economy. Simple and rugged—expressly designed for heavy-duty service—they are used as standard power by leading manufacturers of industrial equipment.



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Indiana Grading Projects

Below — A Rock Cut and at Right a Bridge Over a Stream and Under a Railroad on Project 92C

A Crawler Tractor with a String of Maneys That Handled a Lot of Pay Dirt in Grading Project 92C

Cost Data, Equipment and Classification of Excavation

By C. S. McKee

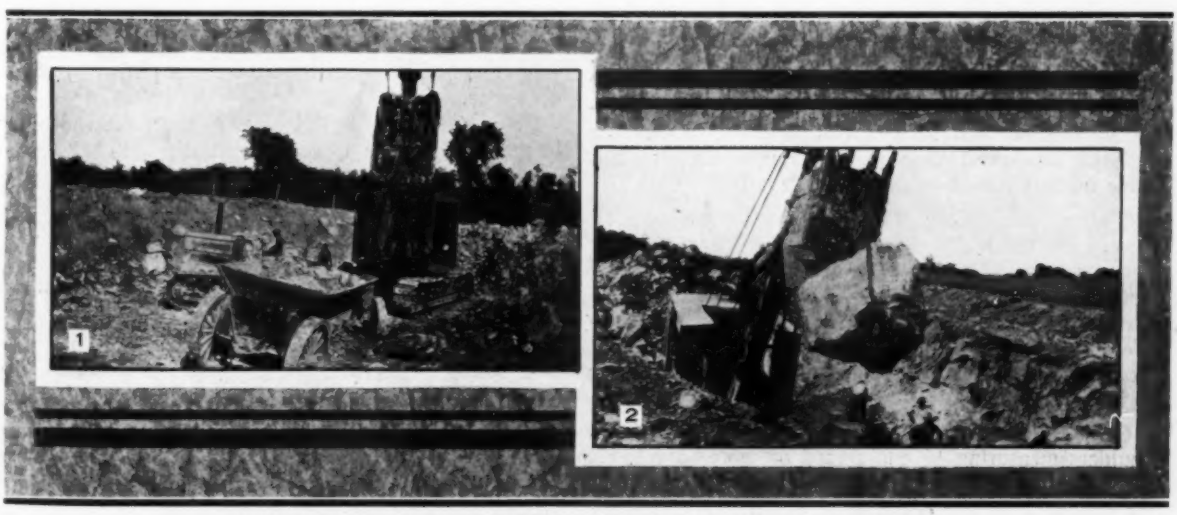
Field Engineer,

Indiana State Highway Department,

Bloomington, Indiana

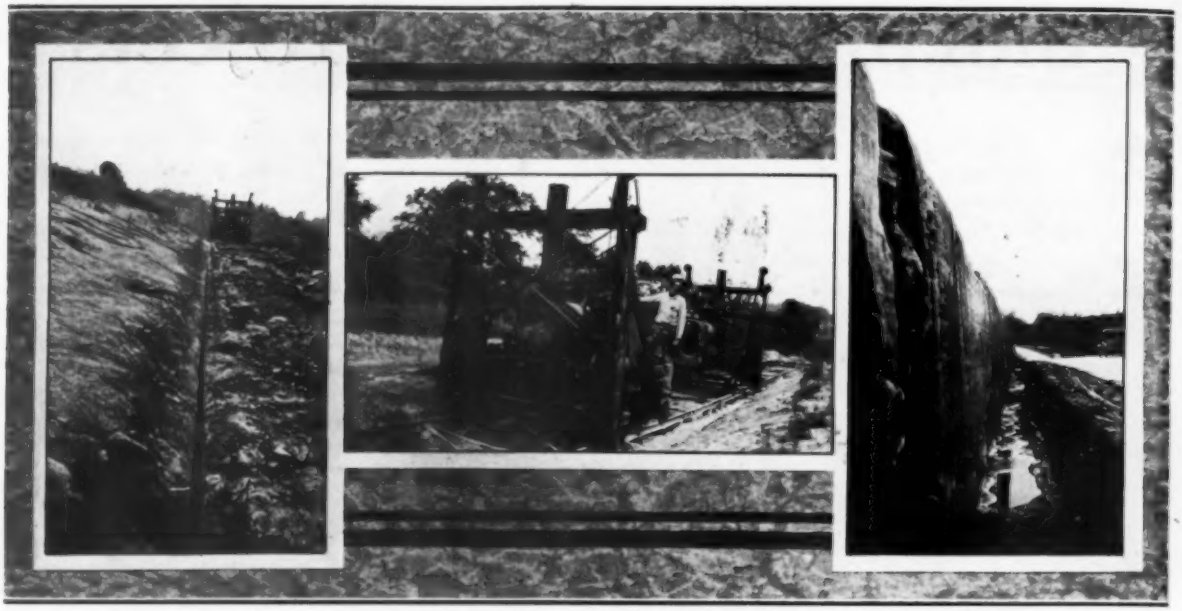
THERE is usually one of two reasons for letting the contracts for grading and paving separately: either to allow the high fills time to settle, or to attract the attention of grading contractors and thereby obtain better bids. Most paving contractors do not have enough equipment to build a big grading job one year and pave it the next without letting their paving equipment stand idle.

The district under discussion is composed of the whole of Brown, Monroe, Greene, and Sullivan Counties and a part of Bartholomew, Lawrence, Owen, Knox, Davies, Jackson, Martin and Vigo Counties. The eastern half of this district is very hilly and scenic. These hills are advertised by a famous hotel as the foothills of the Cumberland Mountains. In this part are found the quarries of fine oolitic building stone, also many quarries of hard Mitchell stone used in road building. The formation of the district changes abruptly at the West Fork of White River. The country west is rolling farm land varying from pure sand to very fertile sandy-loam. Even in this fertile land an occasional clay deposit is found and if the cut is deep enough some shale or sandstone may be found. About all of the materials found anywhere in the state are found in varying quantities somewhere in this district, with the possible exception of muck as found in the Lake region of the north part of the state. The most common materials found are: red or yellow clay, shale, slate, coal, sand, red or white sandstone and limestone varying in hardness from the soft building stone to the hard Mitchell stone.



HANDLING EXCAVATION ON TWO INDIANA GRADING PROJECTS

1. *Loading a 6-yard dump wagon on Project 92B, Road 37.* 2. *Handling a big one on Project 92C, Road 37.*



NOVEL METHOD OF MAKING A CUT WITH A CHANNEL MACHINE IN LIMESTONE COUNTRY
Scenes along Project 92D on Road 37 in Indiana

WHAT THE GRADING CONTRACT INCLUDES

The grading contract covers the building of all culverts and bridges up to and including a 20-foot span, the placing of all pipes and headwalls, the building of all special drainage features such as paved side-ditches, special ditches and rip-rap; and the building of the grade to the grading section. All jobs are designed as paving jobs and the grade figured to balance in sections varying from 300 to 1,500 feet. The grading section is built 2¼ inches below the paving grade plus whatever is allowed for settlement. Theoretically, when the pavement is laid to the correct elevation the correct amount of dirt will be at hand to build the shoulders.

All materials excavated are given one of three classifications, measured in the cut by cross sections and paid for at the unit price bid. Any overhaul is paid as a separate item. These classifications are:

Class A excavation: This classification includes clay, sand, loam, gravel, earth or other similar materials, which may contain loose stones or boulders intermixed, together with all old road beds, except concrete or brick base, and all other material which does not come under Class B or Class C excavation.

Class B excavation: This classification includes all stone and detached rock, measuring less than ½ cubic yard and more than 1 cubic foot in volume, and all slate, shale, conglomerate and similar materials which are soft or loose enough, in the opinion of the engineer, to be removed with heavy machinery without blasting, even though blasting may be actually resorted to in order to expedite the work.

Class C excavation: This classification includes all boulders measuring ½ cubic yard or more in volume, all solid rock, hard ledge rock or other material of similar hardness, in the removal of which it is necessary to resort to continuous blasting.

RECENT GRADING PROJECTS

During the last two years the Highway Commission has let eight grading jobs in this district. Three of these jobs are still under construction. The list of the jobs and the important facts of each are as follows:

Project 128 on Road 46 near Nashville; length, 0.836 mile; Class A excavation, 8,000 yards; Class B excavation, 13,000 yards; Class C excavation, 16,000 yards; approximate cost, $40,000; contractor, Wm. E. Allen, of Bridgeport, Ind.; equipment, one ½-yard Bucyrus-Erie gas shovel, one Keystone excavator with skimmer, five 4-yard White trucks, one Schramm compressor.

Project 135 on Road 67 near Worthington; length, 0.661 mile; Class A excavation, 10,243 yards; Class B excavation, 2,259 yards; special borrow, 14,250 yards; approximate cost, $26,752; contractor, Hart & Hart, of Sandborn, Ind.; equipment, one 1-yard Koehring dragline, one 5-ton Caterpillar tractor, one 5-yard dump wagon, twelve 1½-yard dump wagons pulled by three-up teams.

Project 92 C1 on Road 37 near Harrodsburg; length, 0.491 mile; Class A excavation, 55,222 yards; Class C excavation, 11,221 yards; approximate cost, $31,740; contractor, J. C. Ellis, Rockport, Ind.; equipment, one ½-yard Koehring gas shovel, one 1-yard Speedcrane gas dragline; 1 Ingersoll-Rand compressor. Hauling was started with teams, but as soon as the job was in shape trucks were used.

Project 123 on Road 46 northwest of Bloomington; length, 1.008 miles; Class A excavation, 9,154 yards; Class B excavation, 100 yards; Class C excavation, 250 yards; approximate cost, $6,737; contractor, Kerr & Murphy, of Bloomington, Ind.; equipment, one ¾-yard Erie steam shovel, one 10-ton Caterpillar tractor, four ¾-yard Troy-track scrapers, five 1-ton trucks, one Ingersoll-Rand compressor.

Project 92 B on Road 37 near Needmore; length,

5.631 miles; Class A excavation, 103,304 yards; Class B excavation, 1,114 yards; Class C excavation, 22,319 yards; special borrow, 2,461 yards; cost $98,059; contractor, John J. Quinn Co., Inc., of Bedford, Ind.; equipment, two 1-yard Northwest gas shovels, three 10-ton Caterpillar tractors, six 6-yard dump wagons, six 5-ton Indiana trucks, one Schramm compressor, one Ingersoll-Rand compressor.

Project 92 C on Road 37 near Harrodsburg; length, 2.413 miles; Class A excavation, 34,697 yards; Class B excavation, 13,424 yards; Class C excavation, 20,852 yards; cost, $54,378; contractor, I. D. Clark Co., of Indianapolis, Ind.; equipment, one 1-yard Northwest gas shovel, four 5-ton Autocar trucks, one Ingersoll-Rand compressor, two 10-ton Caterpillar tractors, eight 1¼-yard Maney wheelers.

Project 92 D on Road 37 south of Bloomington; length, 4.851 miles; Class A excavation, 70,463 yards; Class B excavation, 645 yards; Class C excavation, 13,520 yards; special borrow, 3,200 yards; cost, $72,-221; contractor, John J. Quinn Co., Inc., of Bedford, Ind.; equipment, one 1-yard Northwest gas shovel, six 5-ton Indiana trucks, one Schramm compressor, four 10-ton Caterpillar tractors, four 6-yard dump wagons, eight 1¼-yard Maney wheelers.

Project 510 on Road 57 near Newberry; length, 1.5 miles; Class A excavation, 43,392 yards all sand; cost, $22,899; contractor, John Burch Co., of Milwaukee, Wis., sub-contracted by Hart & Hart, of Sandborn, Ind.; equipment, one 1-yard Koehring dragline, twelve 1½-yard dump wagons pulled by three-ups.

UNIT PRICES BID

The following unit prices were bid on the foregoing jobs: Class A excavation, 28 to 52 cents per yard; Class B excavation, 42 cents to $1.50; Class C excavation, $1.05 to $2.50 per yard. Both the high and low bids were due to conditions on the particular job on which they were bid. The average prices on the three classifications were $0.43, $1.45 and $1.45. The low bid on Class A excavation was received on a job where most of the material was obtained from a borrow ditch parallel and adjacent to the road. Part of this material had to be hauled 500 feet as the fill was of varying height and the borrow ditch had to be uniform. The high prices for Class B and C excavations were received on jobs that called for very small quantities of rock to be moved. The prices received on the pipe and concrete work were almost uniform. The average prices for this work were: concrete, $20.00 per yard; 15-inch concrete pipe, $2.25 per foot; 18-inch concrete pipe, $2.75 per foot; 24-inch concrete pipe, $3.25 per foot; steel, $0.05 per pound.

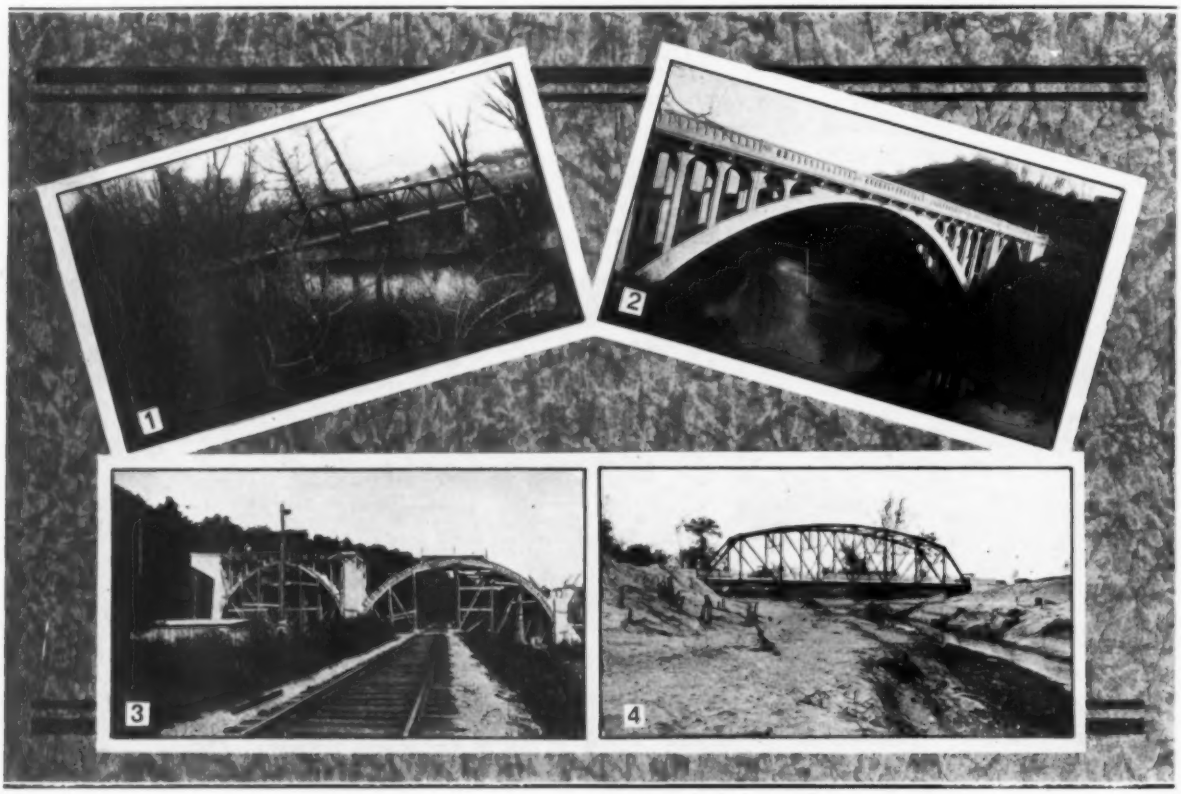
EXCAVATION METHODS ON FOUR INDIANA ROAD PROJECTS

1. Loading sand into wagons with a dragline on Project 510, Road 57. 2. Shovel working in rock cut on Project 92C, Road 37. 3. A Keystone excavator with skimmer loading a truck on Project 128, Road 46. 4. A Northwest shovel working in a rock cut on Project 92B, Road 37

FILLS ON STEEP SLOPES

Some of the fills on this work were built on steep slopes, some of which had a grade as steep as 35 per cent. Hence much care had to be taken to keep them from sliding. Where the slope was very steep it was usually under-layed with rock very close to the surface. In all cases such as this trenches were cut in the earth and blasted in the rock to give the fill a good foothold and also to provide drainage for the water that might run over the surface of the rock. Only one fill slid and it seemed to start on the top of a box culvert that had a slope of 32 per cent.

After getting the ground ready the fills were started full width and brought to grade in 1-foot layers when earth was used. When rock, free from dirt, was used the fills were built in layers varying from 3 to 8 feet in height, depending on the amount of clean rock available and the length of the fill. For spreading the material in the fills some contractors used bulldozers, others used a team and mormon board or just man power. When rock fills were within 1 foot of grade the top was sealed and the additional foot of hill was made with earth. No rolling was required on any of the fills as long as they were compacted by teams or trucks and tractors.



SOME INTERESTING BRIDGES OF THE LAST YEAR IN INDIANA

1. An old bridge on Project 128 *which was replaced by the new and attractive reinforced concrete structure shown in the second illustration. 3. Building a reinforced concrete bridge over the Monon on Project* 92C1 *on Road* 37. *4. Steel bridge built on dry land and then the channel cut under it for the stream on Project* 510, *Road* 57

Is Safety First Just Talk or Does It Pay?

SEVERAL interesting examples, showing that it really does pay to push safety activities in construction, were brought out by William G. Wheeler, Executive Secretary, Committee on Accident Prevention of the Building Trades Employers Association in his talk, "The Dollar Value of Safety" at the Thirty-Fourth Annual Convention of the New York State Association of Builders at Schenectady.

Speaking of the attitude of building contractors toward safety he cited several instances to show the change of front on the part of the operating head of the firm when he realized the value of accident prevention. One of these builders some time ago said that his company was satisfied with the method it had of employing a good insurance company to look after its interests. He seemed pleased to have an experience credit which resulted in a reduction of 15 per cent. He was greatly surprised, however, to learn that ten of his foremost competitors had credits of 35 to 46 per cent.

A year later he returned with a different attitude. His broker had advised him that his renewal rate for the coming policy year would carry a debit of 5 per cent instead of a 15 per cent credit. Instead of a $1.10 saving, he would have to lay 37 cents per year per $100 on the manual rate or a difference of $1.46 per $100 over his previous rate. This was due to the fact that he had never been sold on safety as a business, but he is today and is spending money on it.

Safety in any firm must emanate from the head of the business, and, furthermore, that head has to keep dwelling on it continually or it will die out. Safety is a business and it is a good paying business. One contractor went to Mr. Wheeler recently and told him that he had just received news of the renewal rates for his compensation insurance. He was told that his credit rating would be 46.6 per cent. The average rate for his classification was about $6.62 per $100, but with this credit, he would only pay $3.536. This is a saving of $3.084 on every $100.000 of payroll and will amount to a handsome sum in a year's time.

Contractors
Material Men
Surety Companies
Equipment Distributors
and State Highway Officials

All Pulling Together *in* Pennsylvania

By Samuel Eckels
Chief Engineer, Pennsylvania Department of Highways

ON December 10, 1929, the Pennsylvania Department of Highways called a conference of interests concerned in State highway construction in Pennsylvania. There were represented at this meeting material, surety, constructors and equipment representatives, in all about sixty representatives in attendance.

Samuel Eckels

After explaining Pennsylvania's program for the coming year the fact was emphasized that the program would entail an extraordinary load upon aggregate and equipment producers and that it was the opinion of the Department that it would be necessary for all highway constructors to begin stocking aggregates, starting April 1, and carrying a surplus of aggregate throughout the construction of any project. This proposal was approved by practically all attending the meeting and after a considerable discussion a smaller committee was appointed which consisted of but one representative from the various interests. This committee met the same afternoon when after a further discussion the committee adopted the following resolution:

"That this meeting recommend that a Continuing Committee of Cooperation be appointed under the chairmanship of a representative of the Department of Highways, which will maintain contact with the various interests represented in this meeting (or which should be represented), said Committee to sit as a continuing body during the construction season of 1930."

Cooperative Committee Appointed

Under date of December 23, 1929 a committee known as the Cooperative Committee was appointed, which committee consisted of those represented in the various phases of highway industry. The purposes of this committee are:

1—Cooperation on President Hoover's prosperity program.
2—To coordinate functions of constructors, material producers, surety interests and others as it affects the program of highway construction in Pennsylvania.
3—To assure profitable and continuous employment of labor in the State of Pennsylvania.
4—The production and stocking of materials to assure uniform progress of construction.
5—Encouragement of responsible constructors.
6—The elimination of defaults in the construction industry.

Contractors Urged to Stock Materials

After the appointment of this committee the Department wrote all surety companies and contractors, by circular letter dated January 13, 1930, calling their attention to certain paragraphs of the contract and specifications regarding the stocking of material and urging upon the contractors that they contract for their aggregate requirements for the coming year as promptly as possible, so that material producers may definitely know of the demands which they must meet during the coming construction season and asking constructive cooperation along these lines. This letter received the hearty approval of all interests throughout the State, and a second letter was forwarded to those interested on February 7, supplementing the letter of January 13. This letter was deemed necessary following an intensive study of the equipment situation as it will affect the progress of construction activities in 1930. The follow-

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF HIGHWAYS
HARRISBURG

IN YOUR REPLY PLEASE REFER TO

January 13, 1930

ALL SURETY COMPANIES:

To insure completion of the road construction program of the Pennsylvania Department of Highways for 1930, it will require the fullest cooperation of all interests affected. Our contractors are being notified that they must stock materials in accordance with specification requirements and we are suggesting that they stock in excess of these requirements, in order that paving mixers may be operated continuously. Available material production may not be sufficient to meet peak load requirements.

Our specifications provide that the contractors must furnish the character, quality, and quantity of equipment necessary for the proper execution of the work and that they must prosecute it at such time and in such part or parts, with such forces of workmen, material, and equipment as may be ordered by the engineer to complete the work as per schedule.

Our past experience has proved that some contractors do not understand these requirements and in many cases have not lived up to them. We are suggesting that you keep in close touch with all existing contracts for which you have executed bonds, impressing upon the contractor the necessity of complying with the above requirements and maintaining at all times the schedule of operation as outlined for each individual project.

We further urge upon you to investigate more thoroughly the financial statements and experience records of all prospective contractors who apply to you for the furnishing of bonds for highway contracts in this state. Lack of proper finances, equipment, management, and experienced personnel will only lead to defaults.

Your constructive cooperation along these lines is expected and will be appreciated.

Samuel Eckels
Chief Engineer
C. R. 102

DEPARTMENT OF HIGHWAYS
HARRISBURG

January 13, 1930

ALL CONTRACTORS:

The successful completion of the road building program of the Pennsylvania Department of Highways for 1930 depends upon the continuous operation and completion of the individual contracts within the scheduled time limit. With very few exceptions projects have been, and are being, advertised with a time limit to guarantee completion during the calendar year 1930.

Sufficient stocking of material in advance of requirements, to insure continuous operation of concrete paving mixers, is necessary to complete each individual project, as available material supplies may not be sufficient to meet the demands of peak load construction. Paragraph 60 of the Specifications provides for the method of payment of estimates when materials are stocked. This advance supply will not be sufficient to guarantee completion within the time limit on a large number of individual projects. We are suggesting that on all contracts in excess of one mile in length, that sufficient sand, stone, cement, and reinforcing be stocked for one mile of construction in advance of paving operations, this material to remain in storage to meet contingencies which may arise, and to be used only for emergencies until it is required to complete the last pavement to be laid on the job.

You are familiar with our specification requirements, that the contractor must furnish the quality and quantity of material necessary for the proper execution of the work at such times and in such part of parts, with such forces of workmen, material, and equipment as may be ordered by the engineer, to complete the work in conformance with the contract. Failure to maintain schedules of operations always results in embarrassment to the contractor and you may expect this Department to insist that all schedules of operations be maintained.

All those interested have assured us of their fullest cooperation in expediting work on road contracts.

In order that material producers may definitely know of the demands which they must meet we urge upon each individual contractor to execute contracts immediately for all material requirements and have producers start shipments for storage in stock piles not later than April 1, 1930.

Failure on the part of the contractor to execute his material contracts at once may result in producers not making necessary additions and alterations to plant equipment to guarantee sufficient tonnage to meet your requirements.

Your constructive cooperation along these lines will be very much appreciated.

Samuel Eckels
Chief Engineer
D. R. 102

ing extract of this letter is of interest to equipment producers.

"We find that the equipment manufacturers and renters of equipment can meet all demands of the industry if they are notified sufficiently in advance of the individual requirements expected from them, but cannot accommodate these requirements without delays if too great a peak load is forced upon them.

"We insist upon each contractor prosecuting his job with at least the minimum equipment requirements noted in proposal, which is a part of your contract. If you do not have sufficient equipment available to meet these requirements we would urge upon you the necessity of placing orders at the earliest possible date for new equipment or making arrangements, wthout delay, for rental of such equipment that you may need to comply with these requirements."

EQUIPMENT ORDERS ARE SEASONAL

The manufacturing of contractors' equipment is a seasonal job and usually leads to peak construction because contractors put off placing orders until a few days before shipment is required and often requests are made of the manufacturer to ship at once, the contractor expecting the manufacturer to carry a large stock of equipment used in his particular line of work.

A study of the situation showed clearly that the contractors requiring equipment had highway contracts for a period of from one to six months in advance of purchasing their requirements. Had orders for this equipment been placed at the time of the awarding of the contract and were this followed throughout the year the manufacturing of contractors' equipment would be placed on an even footing and shipments could be made in a much more satisfactory manner.

The only reaction to the action of the Pennsylvania Department of Highways, insisting upon constructors placing their orders for materials, supplies, equipment and machinery has been most favorable and points to the completion of a large and interesting program in Pennsylvania during 1930.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HIGHWAYS
Harrisburg

February 13, 1930

ALL CONTRACTORS:

Supplementing our letter of January 13, regarding the urgency of your execution of contracts with material producers and the necessity of stocking material in advance of actual requirements, we have made an intensive study of the equipment situation as it will affect the progress of our construction activities in 1930.

We find that the equipment manufacturers and renters of equipment can meet all demands of the industry if they are notified sufficiently in advance of the individual requirements expected from them, but can not accommodate these requirements without delays if too great a peak load is forced upon them.

We insist upon each contractor prosecuting his job with at least the minimum equipment requirements noted in proposal, which is a part of your contract. If you do not have sufficient equipment available to meet these requirements we would urge upon you the necessity of placing orders at the earliest possible date for new equipment or making arrangements, without delay, for rental of such equipment as you may need to comply with these requirements.

You will understand in writing to you that we consider this sound advice and ask for your earnest and constructive cooperation.

Very truly yours

Samuel Eckels
Chief Engineer
D. R. 105

S. T. Brotemerkle & Sons, Cumberland, Md., Used Three Lorain 75's to Help Reduce the Uneven Ground at the Pittsburgh, Pa., Airport to Pool-Table Smoothness

Good Organization *on a* 15-Mile Concrete Job *in* Alabama

By S. E. Fitch

Resident Engineer,

Alabama State Highway Department

THE contract for paving Federal Aid Project 198, 15 miles in length, between Opelika and Fairfax, Ala., was awarded on April 5, 1929, to the Morgan-Hill Paving Co., of Birmingham, thereby filling in the last gap in the system of paved roads between Opelika and Atlanta. Indeed, it is said that one can now travel from Auburn, Ala., 7 miles south of Opelika, to Montreal, Canada on hard surfaced roads.

Steady Progress

The work began on May 11 and was completed September 14, 1929. Although no records were broken, work proceeded expeditiously when weather conditions permitted and no machinery breakdowns occurred, with daily runs averaging 1,000 linear feet or 2,000 square yards of 6 to 9-inch concrete pavement 18 feet wide. The longest day's run was on July 31, when 1,256 linear feet were put down; this, according to Bureau of Public Roads engineers is about the maximum amount that can be properly laid in one day by a 7-bag mixer with a 1¼-minute mix per batch. The contractor was aided materially in making this run by the fact that they were pouring up a 6 per cent grade the entire distance, so that the trucks back-dumped cleanly, requiring scarcely any cleaning out.

The Proportioning Plant

The proportioning plant was first set up at Opelika, at the beginning of the project. It consisted of a cement house, capable of holding about 2 cars of cement, a very old P & H crane with a ¾-yard clamshell bucket, and an ancient Blaw-Knox single hopper bin with scales. The crane and the bins were nearly worn out and caused most of the delays on the job. In spite of this the contractor made good progress.

The cement for the job was furnished f.o.b. cars by the State Highway Department. The contractors had to furnish the gravel and sand. Consequently, on account of the much lower freight rates at Opelika, it was decided by the contractor to pave 10 miles from Opelika and 5 miles from Fairfax. This plan was adhered to, the plant being moved to Fairfax, but the cement house remaining at Opelika, where the trucks were loaded directly from the railroad cars. This practice cannot be generally recommended, but in this instance on account of the hearty cooperation of the officials of the C. V. Ry., and the prompt service they rendered in switching and spotting cars, little delay resulted.

Besides the crane operator and his helper there were eight men and a boy used at the plant, as follows: 3 men loading cement, 1 man shaking out and baling empty sacks, 1 man cleaning out cars, 1 man setting scales, 1 man on top of bins picking out pieces of burlap, and 1 man taking off excess material from the loaded trucks. The boy was used to check the Highway Department Inspector's count of batches and to keep account of gas and oil used by trucks. As either the superintendent, cashier or the truck foreman was almost constantly at the plant no regular foreman was required.

Fills Jetted

Considerable inconvenience, expense and some delay were experienced in paving the 10 miles on the Opelika end by the necessity of jetting all fills over 4 feet in height. The proposal for FAP Project 198 called for 50,000 cubic yards of fills to be jetted. This item was carelessly bid in by the contractor at ½-cent per cubic yard, and promptly forgotten. They had always bid on jetting, they said, but never had had to do it, and supposed it would be the same on this job. Finally, after actual paving had begun, realizing that the jetting also had to be done, a crew of men was put to work, and it was rapidly pushed to completion. In the meantime, however, the paving had to be put down in three separate stretches, instead of one continuous stretch in order to give the jetted fills three weeks to dry out and settle. Many long detours to avoid freshly jetted fills and newly laid pavement resulted. All of this could have been easily avoided.

The jetting operation itself was simple enough. A foreman with two helpers, a pump capable of giving 60 pounds pressure, a line of pipe to the fill, and about 50

feet of ordinary hose with 8 feet of ½-inch pipe for a nozzle was all that was needed. Holes were sunk to a depth of 3 feet in all directions; the crust being broken with a pick, only a minute or two was necessary for the jet to eat its way to the bottom of the fill. The cost of jetting was subsequently estimated at about 3 cents per cubic yard.

BATCH HAULING

The contractor depended mainly on a fleet of 10 three-batch Big Mack trucks to get materials from the plant to the mixer, but supplemented the Macks with two-batch high speed Indianas and Internationals, whenever the length of the haul justified it. The latter trucks proved more generally satisfactory in the opinion of the writer, for although the Big Macks "delivered the goods" the weight of the 3-batch load broke down every temporary and some so-called permanent bridges.

FINE GRADING AND FORM SETTING

About 3,000 feet of Blaw-Knox steel forms were in constant use on the job. This amount was necessary to keep approximately 500 feet of forms lined up ahead of the mixer as required by the engineers. Two foremen and about 28 laborers were used in fine grading operations, setting and pulling forms, curing concrete, pouring joints, etc. These graders were always divided into two gangs. In the morning the fine graders ahead of the mixer usually consisted of a foreman and about 20 laborers, including a form setter and two helpers, while the other 8 in charge of a sub-foreman were in the rear pulling forms, putting on silicate of soda, etc. When the grade of the pavement conformed closely to the surface of the road as it usually did, the first operation was to cut the sides to a sufficient depth to take the 9-inch steel forms. This was done with a 5-ton Monarch tractor and an Adams No. 7 road machine. Next the forms were set in place and tamped sufficiently to hold their alignment and elevation. A Lakewood subgrader, whose blades were set to conform exactly to the curve of the under side of the pavement, was then pulled, generally by the roller, as far ahead as the forms were set to line. The subgrade was then thoroughly rolled by a 10-ton Buffalo steam roller, after which the forms were again realigned and trued up to grade. The grade was then, after being inspected by the engineer, pronounced ready to receive the pavement.

A General View of the Paving Equipment on the Morgan-Hill Paving Co. Job Between Opelika and Fairfax, Ala.

CONCRETING OUTFIT

The mixer used was the latest type Koehring 27-E seven-bag paver and gave excellent service. It usually pushed the graders and the form setters to their utmost capacity to keep out of the way. Besides the foreman and mixer operator 11 men were used in running it: 4 cutting concrete; 2 setting the reinforcing steel, greasing forms and the longitudinal bars, etc.; 2 dumping trucks; and 3 emptying the bags of cement on top of the aggregate as the trucks were backed to the skip. A Lakewood planer, or subgrade tester, was used back of the mixer, with blades set as carefully as possible to conform to the parabolic curve of the section. The few arguments that developed during the course of the

work between the engineers and the contractors centered upon the cutting of the planer. In fairly soft material, no matter how much the subgrade had been rolled, the planer cut slightly low; in the hard spots (shale, hard-pan, etc.), even with the whole crew riding it, it was sometimes necessary to back up four or five times to cut to grade.

FINISHING—PAR EXCELLENCE

The finishing, which from the standpoint of looks, riding comfort and impression made upon the travelling public, is probably the most important part of the work, was in good hands on this job. An operator with three assistants was on the job from 5:30 A.M. until 8:00 P.M. They never quit until the surface was "right." An Ord finishing machine with two screeds set to the exact 2-inch parabolic crown required, cut back and forth transversely across the pavement in opposite directions, apparently leaving little for the assistants to do. They managed to keep quite busy, however. Two of them used 10-foot straight-edges with long handles operated transversely across the road removing any "knots" or depressions that might be caused by irregularity or settlement of the forms.

Next an 8-foot hand roller was usually, but not always, run over the surface. The principle service rendered by the roller was to bring up sufficient mortar to finish. After the roller, 8-foot floats were operated from each side similar in manner to the straight-edges. An 8-inch belt was then dragged over the surface removing any marks that might be left by the previous operations, and leaving the surface almost as smooth as glass. But this glass-like finish was not desired so as a final operation a piece of seamless burlap was dragged over the pavement leaving it with a slightly roughened surface. The third man, about an hour afterward, removed the ½-inch steel joint setters and finished the joints. These joints were placed every 50 feet.

METHODS OF CURING

The work of laying the pavement was now completed and the process of curing began. This was done by the second division of the grading gang, consisting of 8 men and foreman. These men had many duties. The first thing in the morning the burlap was removed from the previous day's run. Three men then applied the sodium silicate with hand sprinklers and brushes while the other 5 men pulled forms. By the time the silicate was applied, usually about 8:30 A.M., it was time to commence putting the burlap over the current day's run. From that time on one man was kept constantly wetting the burlap with a 1-inch hose. A team with wagon was used to take the forms and rolls of burlap ahead where needed. The form pulling was generally completed by noon, the laborers engaged in that work then going ahead to the main gang, except one man, who with a hammer and chisel, cut out the film of concrete at the ends of the joints on the previous day's run. Men were used from this gang also, as required, to pour asphalt in the joints. A portable kettle was used for this purpose, keeping about 3 days behind the mixer.

THE GENERAL UTILITY FOREMAN

Finally, the work of the general utility foreman should not be overlooked. He was everywhere at once and always busy. He moved the pumps, laid and took up the pipe lines, jetted the fills, and put up barricades, and sometimes took them down again for his own convenience when he thought the engineer wouldn't suspect him. He accomplished all this with a model T Ford of early vintage and two or three men borrowed from the other gangs as needed.

SUMMARY OF LABOR ORGANIZATION

The forces on the job were as follows: 1 superintendent, 1 cashier, 5 foremen, 7 machine operators, 10 to 18 truck drivers and about 51 laborers. The gangs were organized as follows: At the plant: crane operator, 9 men and a boy in charge of superintendent or cashier. Hauling: truck foreman in charge of from 10 to 18 drivers. Grading: 1 foreman, 1 tractor-man, 1 blademan, 1 roller-man and 20 laborers. Mixer: 1 foreman, 1 mixer operator, 1 finishing machine operator and 14 laborers. Curing: 1 foreman and 8 laborers. Utility gang: 1 foreman, 1 pump operator and from 1 to 3 men borrowed from other gangs.

Common labor was paid 20 cents per hour. The laborers engaged in form setting and finishing received 35 and 40 cents per hour.

PERSONNEL

The work was in charge of Edward King as Superintendent for the Morgan-Hill Paving Co., Birmingham, Ala., and S. E. Fitch as Resident Engineer for the State Highway Department.

Oxwelded Construction for Modern Piping Services

A 77-PAGE booklet entitled "Oxwelded Construction for Modern Piping Services," has recently been prepared and published by the Linde Air Products Co., 30 East 42nd St., New York. It is not intended as a text but rather presents facts pertinent to and the advantages of the oxy-acetylene process for the fabrication of steel and wrought-iron piping systems for all purposes.

The book is made up of eight chapters, the first three being general in character and covering the development of the oxy-acetylene process, the general subject of welded steel and wrought-iron pipe joints and the means of insuring the best results in the use of this method. The remaining five chapters apply to particular fields of piping construction, including overland pipes, power and high-pressure steam piping, welded industrial and process piping, welded building and residence piping and refrigeration piping.

A Change in Massachusetts Highway Specifications

THE Federal Bureau of Public Roads now requires that on all 1930 Federal Aid contracts the fine and coarse aggregate for cement concrete surfacing and the bridges involving more than 1,000 yards shall be weighed instead of having the batches measured by bulk. It is pointed out by the Massachusetts Department of Public Works that inasmuch as it has been the practice of Massachusetts to use the same specifications on state work not under Federal Aid as are used on Federal Aid projects, the state specifications will be similarly changed to make them uniform with Federal Aid requirements.

This change will make it necessary for contractors who are not now equipped with weighing devices to equip themselves with such devices and it is suggested that contractors who purchase new bins should get the two-compartment bins for coarse aggregate, as it appears possible that the Federal Bureau of Public Roads may require a separation of the two sizes of coarse aggregate.

Oil-Surfaced Runways

at the

Curtiss-Wright Field

By W. S. Bartlett

Superintendent of Construction,
Stone & Webster Engineering Corp.

Vitrified Tile Drain in 18-Inch Trench Solves Run-off Problem

THE Curtiss - Wright Valley Stream Field, which is being constructed by Stone & Webster Engineering Corp., for the Curtiss-Wright Airports Corp., at Valley Stream, Long Island, New York, consists of approximately 400 acres of property which originally was used for farming purposes. The airport is conveniently located along the Sunrise Highway and Long Island Railroad.

Grading

In order to grade this property suitably for the airport, the project involved handling over 500,000 yards of earth. It was first necessary to remove all available top soil and stack in conveniently located piles, grade the entire area according to the engineers' plans, and then replace top soil, which had been previously removed. During this operation, there were 14 steam shovels and 80 trucks in use at the peak of this work.

Drainage

The elevation of ground water, over a large portion of the flying area, is approximately 4 feet below the surface grade. French drains have been constructed 50 feet apart over this section. These drains consist of 6-inch farm tile, laid in a trench 3 feet deep and filled with gravel to the under side of top soil. The overall width of the trench is 6 inches wider than the pipe.

Type of Runway

The runways so far constructed at Valley Stream were made to provide a section for flying instruction for the Curtiss-Wright Flying Service which could be used in all kinds of weather and any wind direction. Flying instructors had advised that they were willing to sacrifice length for width and consequently a rectangular area, approximately 600 feet on a side, was laid out.

The type of hard surface to be used for this area was determined after an extensive study of many types of roadways; oiled surfaces, both tars and asphalts; mixed-in-place toppings, and ready-mixed toppings.

In considering the different types of runway construction which might be best suited to our use, the following are some of the necessary qualifications: first, dustproof for mutual protection of public and flyers; second, waterproof, so that it would not be affected by undermining, frost, etc.; third, resilient, to reduce the impact of planes when landing; fourth, soft, for retarding speed of landing planes, by allowing the tail skids to cut in slightly—this also prevents spinning of landing planes; fifth, rebinding qualities, to reduce cost of maintenance caused by tail skids. In order to obtain the above qualifications at a minimum cost, it was decided to employ a mixed-in-place method of construction, using steam distilled Mexican petroleum, containing from 80 to 85 per cent 100 penetration asphalt, as produced by the Atlantic Refining Co. Laboratories at Philadelphia, Pa.

Applying 80 Per Cent Asphaltic Oil to the Natural Sand in Preparing the Runways and Loading Areas of the Valley Stream, L. I., Curtiss Airport

Preparation of Subgrade

In order to provide proper drainage in this entire area of treated surface, the grade of the center of the area was raised 18 inches and graded uniformly in all directions to the edges.

Finish Grading

Over the entire area thus prepared, 6 inches of sand was spread and fine graded. Considerable care was given to this fine grading

Mixing in the Asphalt at the Valley Stream Airport After 3⅜ Gallons Per Square Yard Had Been Applied in Approximately ¼-Gallon Application

in order to insure the proper amount of material in all sections, when grading off the mixed material ready for rolling. There was no attempt to obtain a specified sand with a certain sieve analysis, but simply a clean coarse sand at a minimum cost.

Although the true value of a clean coarse sand was not fully appreciated at the outset, it was soon found that the presence of any loam was extremely costly and the results very unsatisfactory.

PREPARATION FOR OILING

After the grading had been completed, a small tractor with disc harrow attached was run over this entire area preceding the application of oil. The contours made by the harrow exposed the maximum surface of sand to the oil. The oil was then applied at a temperature of approximately 300 degrees Fahrenheit, by a pressure tank truck as shown in the accompanying picture. It was found necessary to use a small tractor to help pull the oil trucks through the soft sand. The oil was applied at the rate of ¾-gallon of oil per square yard of surface.

Immediately after the first application of oil, the disc harrow was again run over the surface, not only to mix the oil and sand as much as possible while the oil was very thin, but also to turn it over and get fresh sand on top for the next application of oil. This operation was repeated until about 2.8 gallons of oil per square yard had been applied to an area large enough to start mixing economically. Even with all of this oil applied there was very little appearance of oil to the eye after it had been once harrowed.

MIXING WITH BLADE GRADERS

The mixing, which was now ready to start, was accomplished by large road grading machines. At Valley Stream, the best mixing was accomplished by heavy road machines having a blade of 12 feet in length. The grading machines took as deep a cut as could be handled without affecting the alignment of the machine or level of the blade, throwing the mixture of oil and sand into a furrow. This was continued until the full depth of sand (6 inches) had been turned into this furrow at the side of machine. When this depth had been reached the grading machines started respreading the furrow, taking only as much as could be handled properly, until the surface was back, as smooth as before starting. These operations were repeated until the oil was thoroughly mixed, at which time the mixture had turned to the true asphalt color. This required at least twenty complete trips of the grading machine. When the proper amount of mixing had been done, the surface had a very solid and compact feeling when walking over it.

THE SEAL COAT

After the entire area had been thoroughly mixed, it was again disc-harrowed about 2 inches deep and a seal coat of the same oil applied to the top surface. This was again mixed a few times with the grading machine. The final application, thus applied, served to enrich the surface and give a better wearing top for the planes.

After the graders had leveled the surface as well as possible, a light drag was used to even out the small irregularities before rolling.

ROLLING

An 8-ton gasoline tandem type roller was used for the final treatment. The roller picked up a certain amount of mixed surface unless the treads were very clean and sprayed with water or oiled with kerosene. When the roller was not equipped with spray, a cloth soaked with kerosene was wiped over the treads to serve the same purpose. In order to avoid waves in the finished surface, the rollers operated first in one direction and then at 90 degrees to that operation.

THE DRAINAGE PROBLEM AGAIN

The next problem to consider for this tremendously

A View of the Finished Sand Asphalt Mixed-in-Place Landing Strip of the Curtiss Airport at Valley Stream, L. I. The Landing Area Measures 600 x 600 *Feet*

large impervious area was drainage. To allow the body of water that this area would shed, during a heavy rain, to run over onto the top soil, would not only make it very soft and soggy, but also be apt to wash a considerable amount of top soil into the drainage line. This problem was solved by constructing a drainage line around the entire perimeter of the area with the center line of the drain pipe 6 feet inside the outer edge of the finished surface.

No attempt was made to install this drainage until the surface treatment was completed. A trench 18 inches wide was cut through the surface on dimension before mentioned and the oil treated material removed (which can be used for patching). A trench digger was employed for excavating the trench. Vitrified tile sewer pipe as a drain was laid with dry joints.

The size of pipe installed for this drainage ran from 8 to 15 inches at the outlet. This pipe was covered with gravel to within 6 inches of the surface. The remaining portion was filled with a large size crushed stone, rolled and treated with an application of Tarvia binder at about 1¼ gallons per square yard. This left the stone still very porous for drainage but bound together sufficiently to withstand the action of tail skids and not be scattered every time a plane taxied over it.

MAINTENANCE

It is expected that the following maintenance will be required. Areas cut up by tail skids must be smoothed off every four to six weeks and rerolled. Each spring the surface must be scarified and, after an application of new oil, rerolled. However, the cost of these operations is kept at a minimum by first using an oil of high bitumen content which will have the greatest rebinding qualities.

If after five or six years, the development and design of airplanes has progressed to a stage where a more permanent type of runway, such as concrete, appears to be more suitable (a point now much in dispute among aviators and engineers) then this mixed surface, which has been produced at small cost, will serve as an ideal subgrade for the concrete.

SUGGESTIONS

Some observations, which will prove helpful to others making this type of runway, are:

First: The presence of loam in the sand requires a great excess of oil to obtain the results desired, and in the opinion of the writer, the maintenance required for areas where loam is present will be much greater than where clean sand is used. The life of oil of the quality used at Valley Stream is greatly reduced by loam. It is economy to buy clean sand.

Second: The temperature of the atmosphere is inversely proportional to the cost of mixing. No mixing should be attempted with a temperature under 65 degrees, and in the fall or the spring, when this temperature occurs for only a few hours in the middle of the day, it is not economy to attempt mixing. At Valley Stream, circumstances carried our work into this type of weather, and we found it uneconomical to proceed when the weather was any colder. An oil more viscuous would mix at a lower temperature but we believe the stability of the surface the following year, in the heat of the summer, would be much less.

Third: Sand seams are apt to appear during the mixing and unless completely removed will give very undesirable results. These seams are in the shape of an inverted "V" and are caused by a wheel of the grading machine cutting into the sand below the oil treated area and bringing it up, on the inside of the wheel tires. The cause must be removed or the finished sections will be separated by these seams. At Valley Stream, it was found necessary to cast a small amount of mixed material in the wheel ruts to stop the wheel from cutting through the sand.

Fourth: The cost is dependent on cleanness of sand, temperature of atmosphere at the time of mixing and shape of treated area. At summer temperature, a long narrow runway, where turning of mixing equipment can be reduced to a minimum, should be built for a cost not exceeding 60 cents per square yard, including the cost of sand, oil, and all operations.

The Take-Off and Landing Area Under Construction Showing the Tractors and Bulldozers Hauling Blade Graders Which Are Turning Over the Local Sand to Mix It With the Asphalt

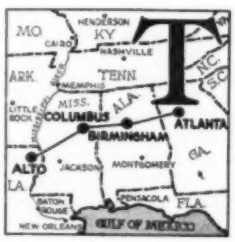
Building a 450-Mile Pipe Line

About 10 Miles of Right of Way for 12-inch Line

By

Victor F. Hasenoehrl

Ford, Bacon & Davis, Inc., New York, N. Y.



THE Southern Natural Gas Corp. pipe line system, undoubtedly the largest pipe line system built or under construction, will furnish natural gas from the Monroe and Richland gas fields in Northeastern Louisiana to Birmingham, Alabama, and Atlanta, Georgia, and many other communities within economic reach such as Columbus, Miss., Anniston, Ala., and Rome, Ga. The main pipe line consists of 31 miles of 18-inch pipe from Alto, La., to a point near Pioneer, La., 32 miles of 20-inch pipe from Perryville, La., to Pioneer, La., about 245 miles of 22-inch pipe from Pioneer, La., to Birmingham, Ala., and 135 miles of 20-inch pipe from Birmingham, Ala., to Atlanta, Ga. The construction of the main line was started in May, 1929, and natural gas is now being delivered in Birmingham and Atlanta.

Obstacles Overcome

A pipe line of such magnitude presents many interesting construction problems. Serious obstacles to pipe line construction are rivers and swamps, the crossing of which calls for ingenuity and skill. The Southern Natural Gas Corp. line crosses seventeen major rivers, the most important of which are the Mississippi, the Yazoo, the Big Black, the Warrior and the Coosa. Wide areas crossed by the line such as the Mississippi and Yazoo River delta countries are subjected to periodic floods, against which necessary precautions had to be taken. The rolling country of North Central Mississippi and the hills of Alabama where rock formations were encountered presented serious difficulties.

Cutting Right of Way in Louisiana

Organization

The pipe used on the main line was plain end steel pipe either lap or electric welded and varying in length from 20 to 40 feet. Dresser couplings using rubber gaskets connected the pipe on practically the entire line. The main line was built by construction crews which were assigned sections from 15 to 40 miles long, dependent on the character of the country encountered, the size and experience of the crews and other conditions. The crews were usually skeleton organizations, the bulk of unskilled labor being local. These crews ranged in size from 80 to 250 men and could lay up to 8,000 feet of pipe per day. A good average performance for a crew consisting of about 150 men working 10 hours per day was 4,000 feet. The work done by each crew or under the supervision of its general foreman may be divided as follows: 1. Clearing the right-of-way; 2. Stringing pipe and other material; 3. Painting pipe; 4. Ditching and grading ditch; 5. Connecting or laying pipe; 6. Lowering pipe into ditch; 7. Backfilling and "cleaning up."

PAINTING THE PIPE BEFORE LAYING

1. Painting a 22-inch line on the rolling rig. 2. Hand priming before painting the pipe. 3. Painting a pipe by hand pouring and spreading with a hand pad while the pipe was rotated

CLEARING THE RIGHT-OF-WAY

The clearing of the right-of-way was either subcontracted or performed by the labor contractor himself. A right-of-way crew consisted of about 20 men under the direction of a foreman and one team. A typical crew consisted of: 1 foreman, 10 men cutting underbrush, 7 saw men, 5 axe men, 1 team.

A gang of this size was expected to cut about a mile of right-of-way per 10-hour day in average wooded country. The specifications called for a right-of-way 30 feet wide unless otherwise specified.

STRINGING

Stringing consisted of the unloading and hauling of material from the railroad sidings, where it was shipped, to the right-of-way. It was usually done by the labor contractor but was also subcontracted. The pipe was unloaded at the railroad siding by A frames or gin poles whose motive power consisted of a truck. The pipe was placed on trailer trucks which carried from two to seven joints of pipe depending on the capacity of the truck, the size and weight of the pipe and the condition of the road to be used. A Ford size truck averaged about 90-ton miles per day, whereas the unloading crew at the siding consisting of from 5 to 7 men could unload about 12,000 feet or about 600 tons of 22-inch pipe. When the pipe was unloaded at the right-of-way great care was taken not to injure or dent it. A good way of doing this was to drop the pipe on automobile casings. Couplings, bolts, paint and other materials were strung off trucks also. They were strung so as to insure a minimum of material moving after the stringing trucks had left. For example, 50-gallon barrels of coupling paint were strung from 30 to 35 joints apart on 22-inch pipe 40 feet long.

Economy in Clothing

PAINTING

As soon as possible after the pipe was strung it was painted. The nature of the paint to be applied, that is, its chemical character and whether hot or cold, was dependent upon soil conditions which were determined by a soil analysis. The couplings connecting the pipe were painted after the pipe was connected and before it was lowered into the ditch.

The first operation was to clean the pipe and couplings of dirt, rust or grease. Where a hot paint was used the pipe and couplings were at first covered with a prime coating. This prime paint was applied by hand with long handle brushes. A prime paint crew consisted of about 15 men and a subforeman. After the prime paint had dried sufficiently the hot enamel was applied. The paint was heated to about 350 degrees Fahrenheit and then applied to the pipe by using hand or motor-driven rolling rigs which revolved the pipe while the paint was poured on it. The pipe might also have been painted by using the so-called granny-rag method. This method consists of the use of a canvas sling which is applied to the bottom of the pipe. In hot weather the pipe was painted with whitewash or a solution of salt and lime to keep the enamel from becoming too soft, due to exposure to the sun. A crew applying hot enamel by hand-driven rolling rigs consisted of: 1 foreman, 1 team, 6 kettle men, 6 pouring men, 6 rolling men, 4 service men, 15 men for miscellaneous labor.

A crew like the above can cover on the average 4,000 feet per 10-hour day. A good performance applying hot enamel to 40 feet of 22-inch pipe is 4 minutes per joint.

Where the soil conditions did not require the use of hot paint, the pipe was painted with cold paint. Cold paint was applied with hand brushes or canvas slings. A crew of 1 foreman and 15 men could cover about 4,000 feet per 10-hour day under average conditions.

DITCHING

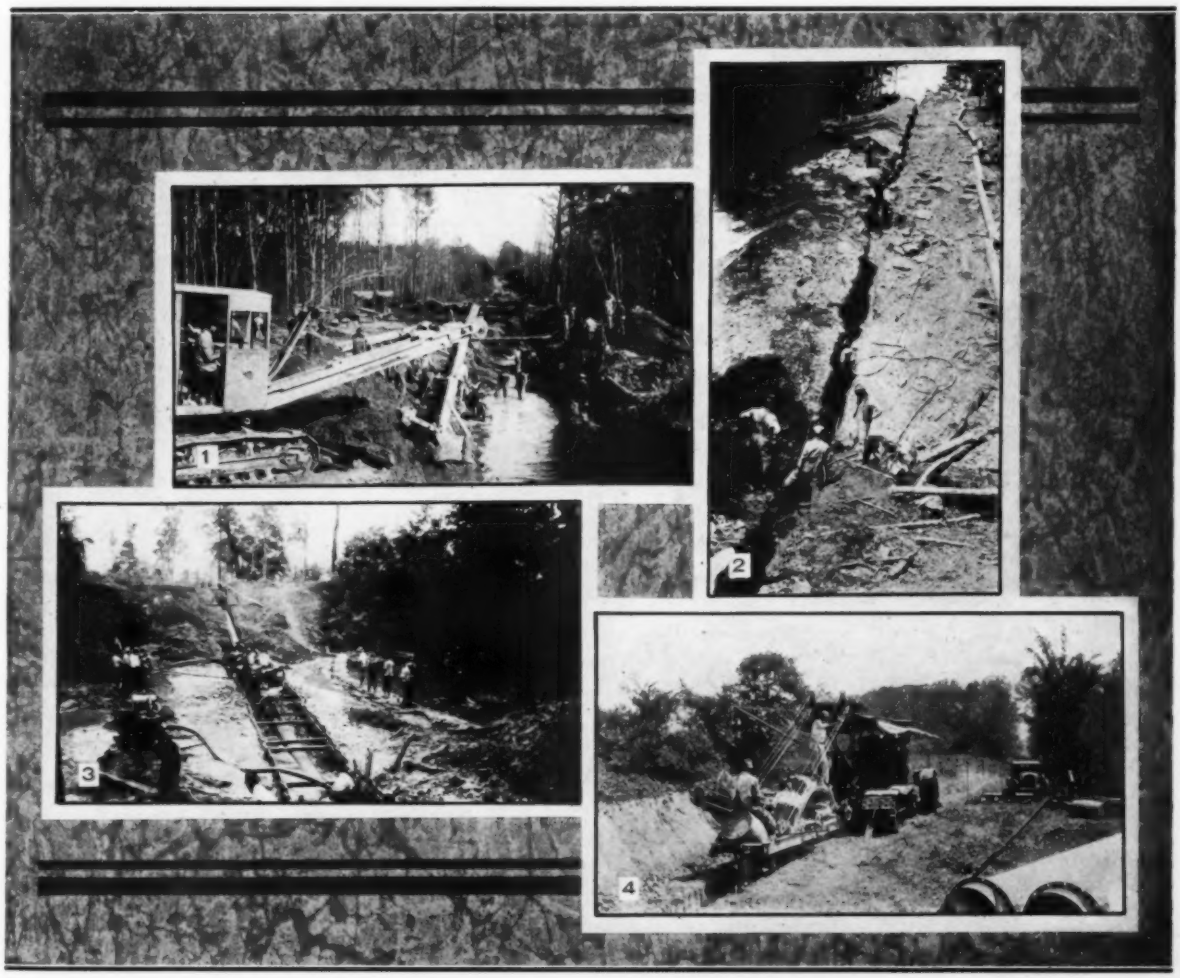
Most of the ditching was done by traction ditchers of the wheel type such as the Buckeye. Insley shovels were used in hilly country. The specifications called for a ditch about 60 inches deep and 7 inches wider than the outside diameter of the pipe. The ditching crew consisted of a foreman, a blaster and 2 helpers who dynamited tree stumps and other obstacles which were in the way of the ditching machine, a gang of about 10 men and a team which placed logs over stump holes, drainage canals, etc., to enable the ditching machine to pass over them, the ditching machine operators and their helpers and a grading crew of varying size dependent on the character of the country encountered.

The ditch had to be cut as straight as possible since the specifications did not allow a break in excess of 2 degrees in any coupling. Sharp bends in the ditch had to be avoided unless the character of the country necessitated them and all curves had to be gradual. Where the terrain was hilly or rolling, short joints varying in length from 20 to 30 feet were used. But even then gulleys and ravines necessitated the fire bending of pipe. In some cases it was necessary to cut the ditch as deep as 15 feet to insure no sharp bends in the pipe.

Usually the ditching machine operated 24 hours a day which necessitated three shifts of operators and helpers. Under these conditions a mile of ditch per day could be cut in flat country.

LAYING

While the ditch was being graded coupling followers and rubber gaskets were slipped over the ends of the pipe and as soon as the grading was completed the pipe was placed on skids over the ditch. This was either done by hand or by using a small tractor of the



EXCAVATION UNDER WAY IN A VARIETY OF CONDITIONS

1. An Insley shovel at work on a trench for a 20-inch line in Georgia. 2. Some rock excavations where pneumatic drills came in handy. 3. A cofferdam being built across Otter Bayou in Louisiana. 4. A Buckeye traction ditcher working on the trench for a 22-inch line

Fordson type. When it was done by hand about 25 men were required. The pipe was then connected or "laid" by using a pipe traction crane such as a Buckeye whirler. The laying crew consisted of about 25 men which included 2 machine operators and the stabber whose job it was to see that the pipe was laid straight and that each joint was "home" in the coupling. As soon as the pipe was stabbed it was placed again on skids and the couplings bolted together. The couplings were then painted either by hand or by the use of a coupling painting machine. The coupling paint was soft to lessen the possibility of cracking when the pipe was lowered into the ditch. A typical "laying" crew consisted of: 1 foreman, 25 skid and rolling men, 1 stabber, 1 tractor operator, 2 pipe crane operators, 10 crane helpers, 20 coupling bolt men, 1 bolt inspector, 1 paint subforeman and 10 paint men.

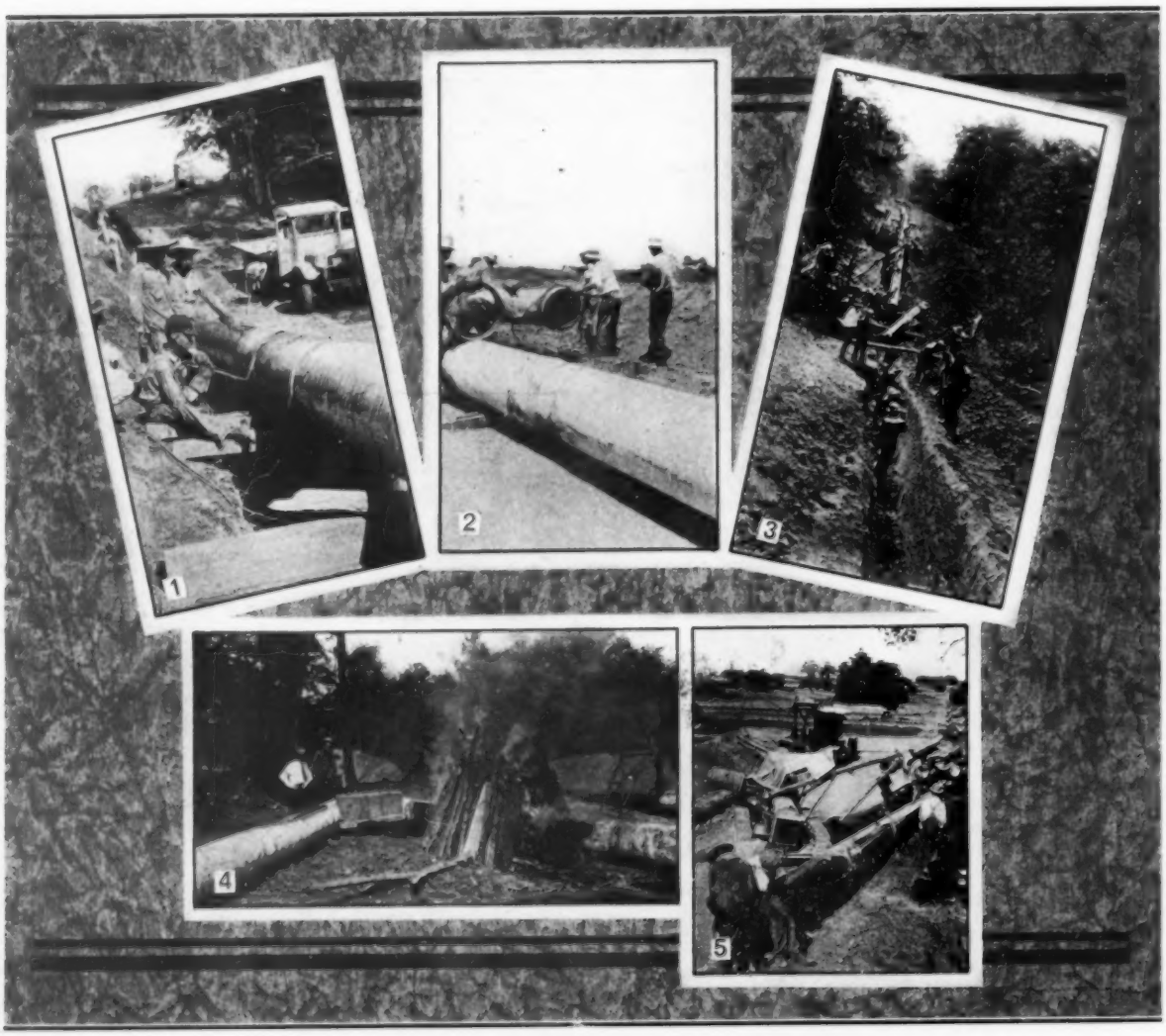
In swamps and anywhere where water might attack the rubber gaskets in the couplings as also on highway and railroad crossings the pipe was connected by welds, the welding being done according to the specifications of the American Gas Association.

LOWERING PIPE INTO DITCH

After the pipe was connected it was lowered into the ditch either by hand using a mope pole or by a tractor crane. A Fordson tractor with a stiffleg attachment was used advantageously. While being lowered the pipe was supported by iron or wooden horses. From 15 to 20 men were required when the pipe was lowered with a Fordson and from 25 to 30 men when it was lowered by hand. The pipe had to lay straight in the ditch and had to be fitted snugly against the outside wall in curves. The pipe was not allowed to rest on the couplings when in the ditch and where rocky formations were encountered the couplings had to be bellholed.

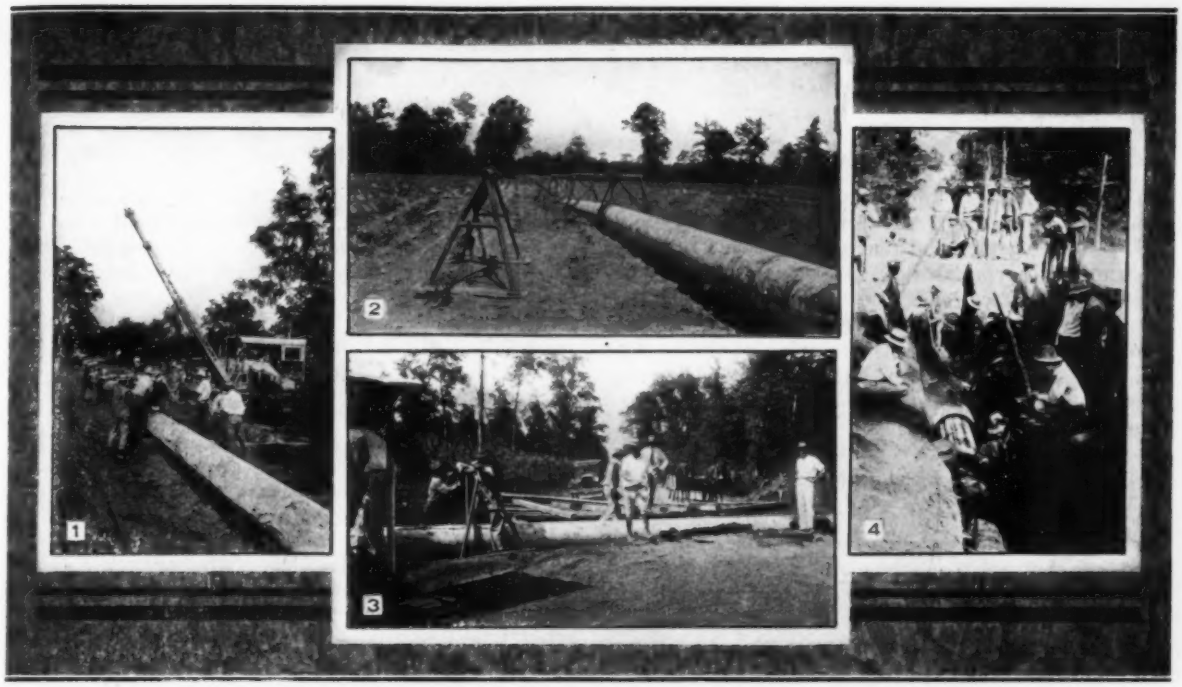
BACKFILLING

Practically all backfilling was done by machines,



CONNECTING PIPE AND MAKING SAGS OR BENDS

1. Oxy-acetylene welding a 22-inch pipe near Epps Road, La. 2. Placing gaskets for the Dresser couplings. 3. Placing a vertical bend or sag in a valley between two hills. 4. Making a fire bend in one of the few instances where a sharp angle was necessary. 5. Good organization, the pipe laying gang working close behind the ditcher.



LOWERING THE PIPE INTO PLACE AFTER CONNECTIONS HAD BEEN MADE

1. Pipe being "stabbed" or swung into place and connected with the Dresser couplings. 2. Pipe suspended on horses just prior to lowering into the trench. 3. Lowering the pipe into place at a crossing of an earth highway. 4. Completing a highway crossing under a hard surfaced road. Note the pipe inside the casing.

although a mule-drawn marmon board was used in an emergency. A Buckeye 1½-yard backfiller was frequently used. Where the pipe was laid around sharp curves or where bends were made the pipe was held in place by concrete blocks of varying size as an extra precaution. The specifications called for a 1:3:5 concrete mix. The backfilling crew also protected the ditch against washouts on grades by placing boards and underbrush in it. The backfilling crew was followed by the "cleaning up" gang which replaced fences, cleaned ditches on highway and railroad crossings and graded the backfill by hand if necessary. This cleaning up gang consisted of a subforeman and about 12 men.

A Complete Crew

It will be seen from the above that a representative pipe line crew consists of about 240 men which may be divided as follows:

Clearing right-of-way	25
Stringing pipe and other material	20
Painting pipe	40
Ditching and grading ditch	35
Connecting or laying pipe	75
Lowering pipe into ditch	25
Backfilling ditch and cleaning up	20
Total	240

A crew of this size is only needed when all operations are performed simultaneously, which may result in an average performance of a mile of pipe laid per 10-hour day. Occasionally smaller crews are used, each gang performing different operations such as laying and lowering. This, of course, cuts down the daily performance.

A Typical River Crossing

The preceeding description of the different construction operations does not pretend to show how all the problems which confront a pipe line crew are solved, nor does it cover such important items as river, railroad and highway crossings.

There are seventeen principal river crossings on this line, the largest of which is the Mississippi crossing. Practically all river crossings consisted of multiple lines to lessen the possibility of a breakdown. These multiple lines, consisting of welded or screw pipe, were weighted down with heavy cast iron river clamps and bowed upstream to prevent any displacement by the current. The pipe was connected on barges and then lowered into the river while the barges were slowly towed across the river. Most river crossing crews worked in three 8-hour shifts to shorten the time of crossing and not to tie up any river traffic.

The crew on the Mississippi River crossing which consisted of six 10¾-inch lines comprised: 1 general foreman, 1 pipe testing foreman, 25 men testing pipe,

Grief—During a Flood the Line Floated

3 shift foremen, 3 pipe foremen, 3 pontoon foremen and 120 laborers. The floating equipment consisted of: 2 or more tugboats, 1 derrick barge, 1 laying barge, 2 or more pontoons, 2 or more material barges, 1 or more speedboats.

RAILROAD CROSSINGS

The line crosses approximately twenty railroads. Practically all railroads had to be tunnelled. The pipe was welded together and placed in a casing of larger diameter with vents on both sides as an extra precaution. Hard surface roads also had to be tunneled, but most dirt roads were crossed with an open ditch. Gates were set in 10-mile intervals beginning at the western end of the line. A telephone line was also installed. A compressing station of 5,000 horsepower was erected near Reform in Pickens County, Ala.

PERSONNEL

The Southern Natural Gas Corp. pipe line system was built for the corporation by Ford, Bacon & Davis, Inc. The contractors for the main line were: Williams Bros., Inc., Tulsa, Okla., from Alto and Perryville, La., to Yazoo City, Miss., not including the Mississippi River crossing, but including from the Mississippi-Alabama state line to Birmingham, Ala.; Oklahoma Contracting Co., Dallas, Texas, from Yazoo City, Miss., to the Mississippi-Alabama state line; Hope Engineering Co., Mt. Vernon, Ohio, from Birmingham, Ala., to Atlanta, Ga.

Sewer Contract Awarded to Girl

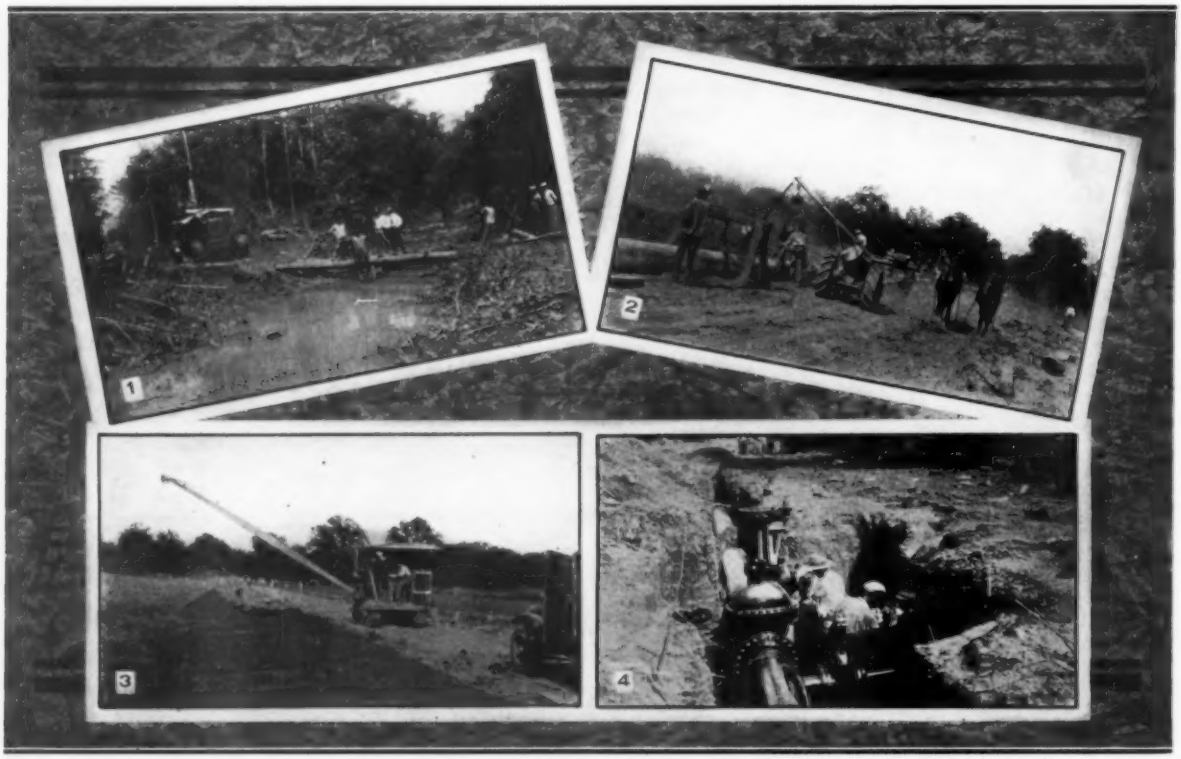
THAT the scope of woman's activity in the business and professional world is definitely and steadily extending is proved once more by the award of a sewer contract in Queens County, Long Island, N. Y., to Julia Gallo, 21 years of age. This contract, which is for the construction of a sewer and appurtenances in Elmhurst, is the first in this county to be awarded to a woman.

Miss Gallo is the daughter of James Gallo, a sewer contractor of Flushing, L. I., and has received her training and experience in his office where she prepared estimates for him and when occasion demanded, went out on the job and acted as superintendent or inspector.

St. Paul's Chapel Emerges from Chicken-Coop

FOR many months, St. Paul's Chapel, Broadway and Vesey St., New York, has been completely surrounded with a unique scaffolding closely resembling a chicken coop. This 163-year-old edifice has been undergoing an 8-months treatment for the removal of about 15 tons of rotted stone, following which the structure was treated with hot paraffin and patched with new stone.

Many of the brown stone blocks were completely disintegrated and had to be removed. Parts of others were cut away and filled in with a red composition which harmonizes with the original stone. Bit by bit the whole stone surface was heated to about 200 degrees Fahrenheit and then caused to absorb hot paraffin which excludes water, the chief agent of decay in the case of brown stone, and which resists bacteria, acids, and crystallization, enemies of marble and other stones. The work has been done by the Obelisk Waterproofing Co. of New York.



FROM TRENCHING TO COMPLETED LINE

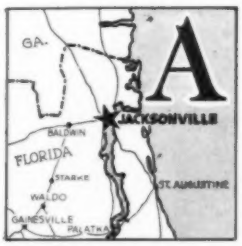
1. Preparing to move a ditcher across a small bayou on a log span. 2. A Fordson with a boom raising pipe for the removal of the skids before lowering the section into the trench. 3. A Buckeye backfiller working near Pioneer, La. 4. Setting a main line gate.

Novel Construction to Keep Mud Out of Creek

Timber Deck Permits Water but No Silt to Rise and Flow in Channel

By Charles V. Imeson

Consulting Engineer, Jacksonville, Fla.



AFTER more than twenty-five years of effort on the part of the Springfield Improvement Association, a woman's organization in the Springfield section of Jacksonville, Fla., Hogan's Creek, which has long been an eyesore to the people living adjacent to it is being beautified and its flood and tide waters controlled. This creek is affected by ocean tides; it has a watershed of about 2,500 acres of land and was subjected to overflow from heavy rains and during high tides. During low tides and dry weather which exposed the creek bottom, a mass of mud and trash was revealed.

Due to the efforts of the Association the city voted $500,000 in bonds for the improvement of this creek. Early in 1928 the City of Jacksonville employed H. J. Klutho, Architect, and the author as Engineer, to prepare plans for the improvement of this project. On February 29 the plans and specifications were submitted to the City Commission and in June a contract was made with Robert G. Lassiter & Co., to construct the improvements at a cost of $400,000. All architectural details and beautifications were handled by Mr. Klutho and the engineering details and design by the writer. A. W. Vinton, General Superintendent, was in charge of the work for the contractor.

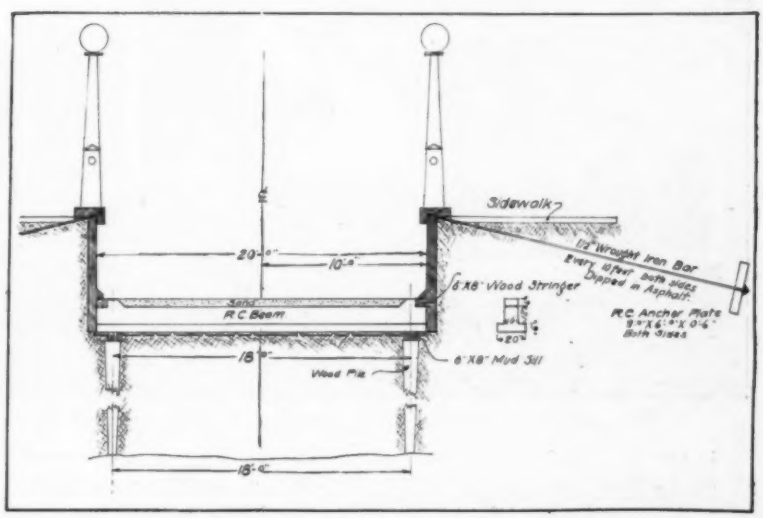
Scope of Work

The work entailed the changing of the creek channel in several places, the construction of automatic tide locks and pumping plant, bulkheading approximately 6,300 linear feet of the creek and two small lakes, through which the creek will pass, the construction of six new reinforced concrete bridges and the reconstruction of four old ones, the construction of three concrete foot bridges and the laying of approximately 10,000 square yards of sidewalks, together with hand rails, electric lighting and beautification features. The finished with an average overall width of 20 feet between walls with an average depth of 5 feet below the coping.

The creek passes almost wholly through park property that was acquired during the earlier periods of Jacksonville history. Much of this ground was overflowed marsh lands and cypress ponds and, extending over a period of years, became the city's dumping grounds until the filled-in materials was brought above the high water mark. Underlying this fill are muck, or peat beds, from 10 to 20 feet in depth. Below this muck strata are sand beds of varying depths, overlying the rock. Several hundred wash borings along the creek line showed rock from 25 to 40 feet below the ground surface. Much of the muck is in a semi-fluid state and is subjected to movement by the pressure of the creek banks. Several places where heavy fills had been made the weight of the fill forced the muck upwards, filling the creek channel.

Owing to the unstable character of the soils making up the lower ground stratas it was not possible to use any of the ordinary types of sheet pile bulkheading with any degree of security, and it was to meet these peculiar ground conditions and stay within the money appropriated that the bulkhead shown in the accompanying illustrations was designed.

Timber for supporting the bulkhead piles was driven to rock and cut off 2½ feet below the flow line of the creek and capped with mud sills extending longitudinally with the creek. Reinforced concrete beams resting on mud sills with the bottom floor boards between were placed at 5-foot intervals to support the two side walls and take the inward thrust of both walls.

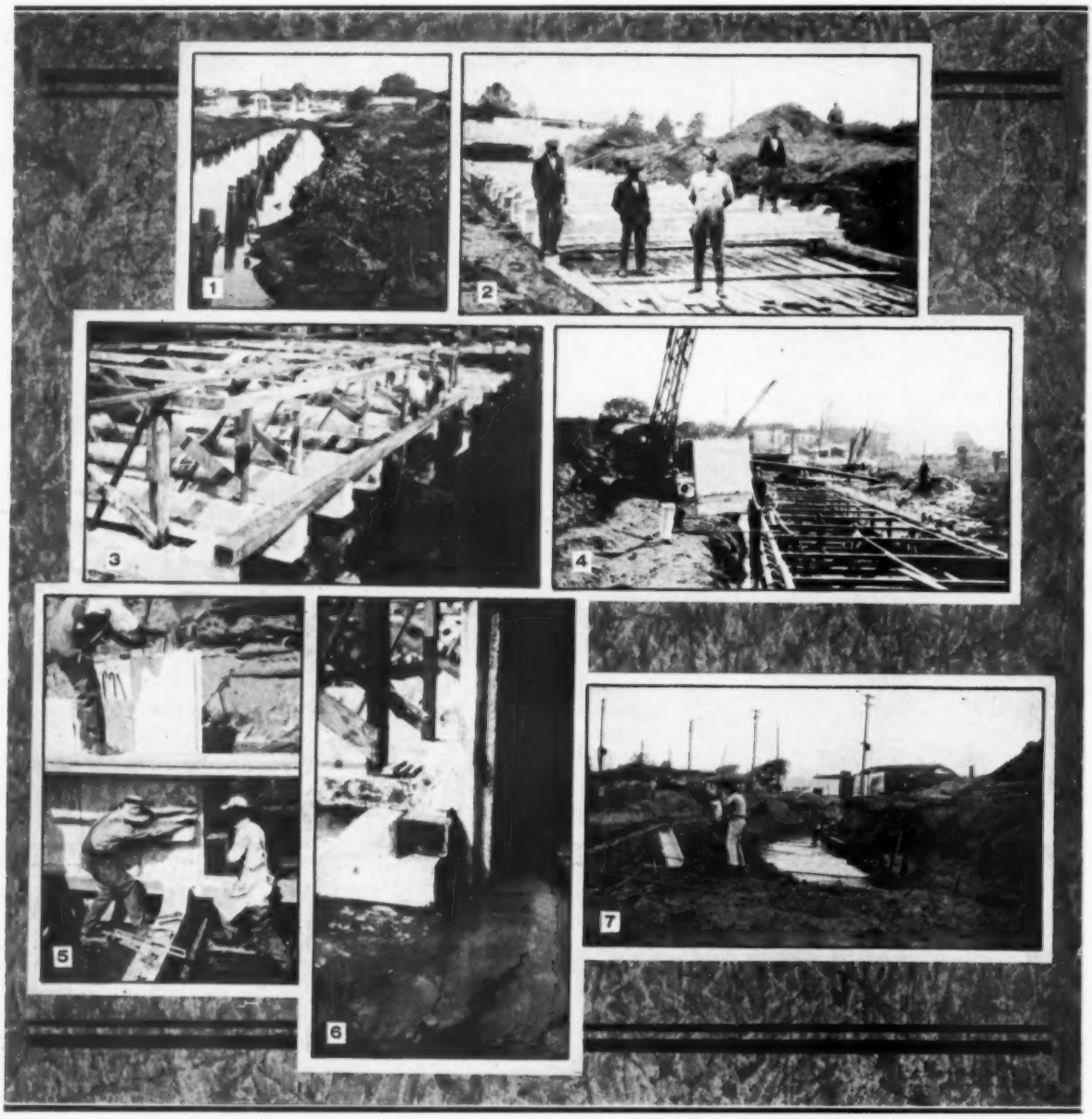


A Typical Cross Section of Type A Construction

A 6 x 8-inch wood stringer was then placed to support the side walls and back of this the 6-foot slabs were set in the walls. These slabs interlocked and were set snug against the wood stringer and shoulder on the beam. The slabs were tied back with 1½-inch wrought iron rods 20 feet long with a reinforced concrete anchor block 6 inches x 3 feet x 6 feet spaced 10 feet on centers. The reinforcing steel of the slabs was bent over and tied to four ⅝-inch horizontal bars in the coping. The coping is 22 inches across the top with a 10-inch face showing and 6 inches on the rear side. All members of this type of construction were precast except the coping which was cast in place.

The slabs for the side walls are tongue and groove, 6 inches thick and vary in length from 7 to 12 feet. They are reinforced with five ⅝-inch round deformed bars part bent over at the lower end for shear steel in the foot projection. The first slabs cast were 2 feet in width but later all slabs were cast 6 feet in width, as it was found that better alignment of the walls and more rapid construction could be made with the increased width.

The forms used for casting the slabs were rolled sheet metal about 3/16-inch in thickness. These forms were laid parallel, and spaced the proper distance, on preparing casting ground. The concrete was poured and



PROGRESS PHOTOGRAPHS ON THE HOGAN'S CREEK PROJECT IN JACKSONVILLE, FLA.

1. Piles for supporting the bulkhead. 2. The reinforced concrete beams resting on mud sills. 3. The 6 x 8-inch wood stringer placed to support the side walls. 4. Setting one of the 6-foot slabs. 5 Placing one of the earlier 2-foot slabs. 6. Close-up of end of interlocking slab showing it seated on the wood stringer. 7. The slab being tied back with 1½-inch wrought iron to reinforced concrete anchor blocks

DETAILS OF THE WORK ON THE PEARL STREET BRIDGE

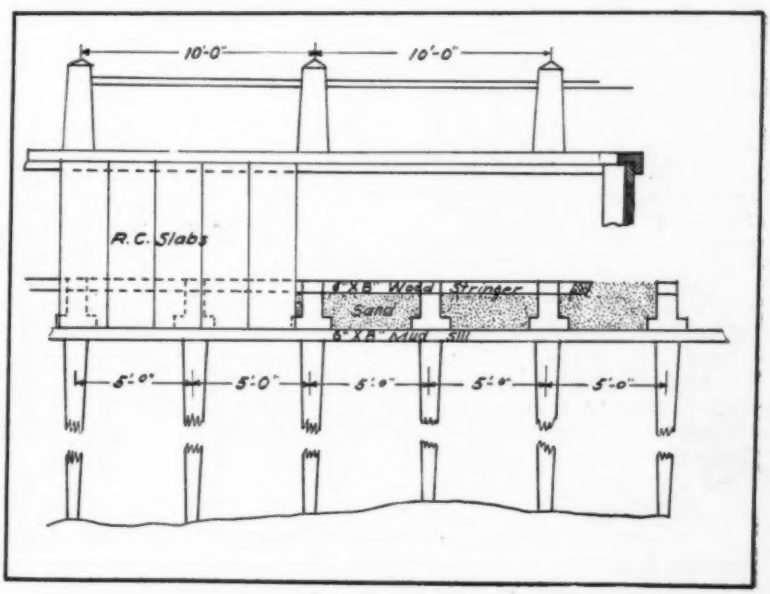
1. *Site of the new bridge showing the old culvert pipes in place and the mud sills exposed.* 2. *The old cap timbers over the piles in place and a portion of the new 3-inch timber deck at the right.* 3. *The 6 x 10-inch timbers cast into the concrete footings.* 4. *Work nearing completion in high water*

worked only on the inside face. This method of casting made the tongues and grooves uniform, allowing for fairly tight fitting joints.

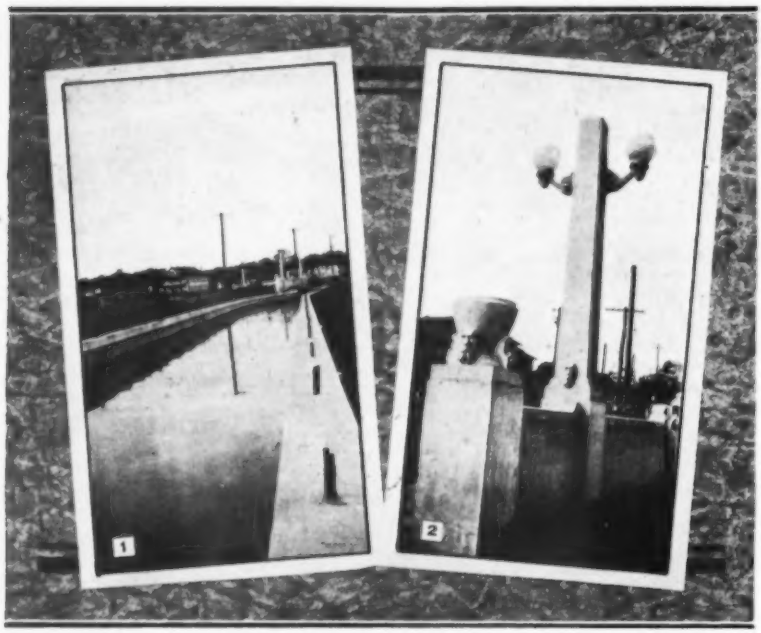
All concrete used in the entire construction was based on Portland Cement Association specifications and was designed for 3,000 pounds per square inch strength in 28 days.

While this project primarily was intended for flood and tide control the final result will be drainage of surrounding lands and the creation of ground storage for future rains by lowering the present water table about 3 feet. This was made possible by the adoption of the type of bulkhead described. Boards or planks were placed between the mud sills fairly close together directly under the reinforced concrete beam extending the full distance across between the sills. Over the plank, and between the beams, a sand fill 2 feet in depth was made. This type of bottom construction prevents the muck from moving upward and allows the water to pass freely up into the creek. All wood used in this construction is perpetually submerged in from 2 to 5 feet of water.

From station 0+00 to station 26+50, consisting largely of three small lakes, the minimum water elevation will be held to 2.4 feet. At this latter station the water drops over a spillway to elevation + 0.6 feet. Owing to the flat terrain the flow line from 26+50 to 41+100 is — 1 foot. From



Sectional Side Elevation. Type A Construction



A PART OF THE FINISHED WORK

1. A part of the finished bulkhead before the hand rails were installed. 2. The type of ornamentation and lighting used on the ten bridges in the project

station 41+00 to station 77+20 there is a drop of 2.4 feet, or aproximately 13/16-inch per station.

TIDE LOCKS AND PUMPS

One of the major problems to be met was the controlling of the tide waters. Jacksonville is situated on the St. John's River, about 20 miles from the Atlantic Coast. The average tide is 12 to 14 inches. During severe northeast storms the winds often back the water up to 4.5 feet elevation. These storms are invariably accompanied by heavy rains. It was during these periods that the creek overflowed its banks, covering adjacent lands and low streets, interrupting car service and traffic.

At the lower end of the project, at station 77+20, two reinforced pump pits and pump house were constructed. The pit floors have a minus reading of 5 feet, with a spillway of +0.6 feet—the minimum water elevation to be maintained in the creek. On the down stream side of the pump house are two vertical swinging tide locks of wood construction and all bronze trim. The locks are automatic in action and work on the same principle as the ordinary swing check valve.

The pumping equipment consists of two 10,000 to 16,000 gpm Yeomans Bros. automatic, electrically controlled, vertical centrifugal trash pumps of the submerged type, each driven by 50-horsepower motors. During high tides the locks will prevent the tide water from entering the bulkheaded section of the creek and the pumps are intended to hold the storm waters down below flood stage.

PEARL STREET BRIDGE

Pearl Street crosses Hogan's Creek at an angle of 37 degrees. Two lines of 60-inch diameter and 1 line of 45-inch diameter concrete pipe, supported on piles, and flanked by end walls, constructed several years ago, was inadequate for the flow of the creek waters. These pipe lines were removed and a double barrel culvert of a total overall width of 21 feet was constructed. The purpose in this type of construction was to make use of the pile foundation to support the culvert; and of the end walls to support the typical hand rails and ornamentation used on all bridges. No cut-off walls were driven under this structure as the timber deck answered the purpose for confining the soil movement.

Another Jacksonville Creek Cleaned Up

In the December, 1929, issue of CONTRACTORS AND ENGINEERS MONTHLY *appeared an article by Joseph E. Craig on the methods used to clean up McCoy's Creek, a sluggish stream which meandered for 3 miles through the city. Both bulkheading and a 36-foot concrete arch underpass were used on this project.*

Accessibility of Materials Cuts Bid Prices on Roads

CONTRACTS for 65.4 miles of 20-foot concrete pavement to be built in 1930 were awarded the third week of December by the Minnesota State Highway Department at prices lower than other 1930 jobs let in October, or the 1929 jobs let last spring. Accessibility of materials on all jobs in the December list helped to bring down the prices, but, according to Commissioner C. M. Babcock, better bids are generally received anyway when work is let in the fall or winter.

The December letting brings the total paving let for 1930 construction to 199.5 miles of 20-foot width and 3.9 miles of 27-foot slabs. The average contract price for 20-foot pavement for 1930 is $16,395 while the cement which was purchased separately will cost $7,715 per mile, making the average cost per mile $24,110. The average contract price for 20-foot pavement built in 1929 was $24,333.

The Lake Champlain Bridge Proving Profitable

THE much-discussed Lake Champlain Bridge, the construction of which was described in some detail in the August, 1929, issue of CONTRACTORS AND ENGINEERS MONTHLY seems to be a distinct success. Grave fears were felt by some that traffic between New York and Vermont would not use this bridge as it was not on an established route but, of itself, created a new route. The revenues to date are more than double the amount estimated as necessary for financing the undertaking. Up to Armistice Day the sum was nearly $30,000, the greater part of which was collected from automobiles, although every day, with but three exceptions, the bridge has had some foot passengers.

The bonds for the building of the bridge were issued for a term of thirty years, and there is a prospect now that it may be possible to provide for them within half that period. Thus, an agreeable money asset is painted into a picture which in all other respects is pleasant to contemplate. The bridge does fulfill a concept of the traditional phrase about a "long-felt want."

The Editor Comments —

Ready-Mixed Concrete

Several contractors have written me for some information on the ready-mixed concrete business, "Is it a good side line for a contractor?" asked one. Another inquired, "I am seriously considering starting a ready-mixed concrete business to tide over slack time in my work. Are trucks of the agitating type preferable to those which are charged with a dry batch which is mixed during the haul?"

A Side Line

We have published a number of articles on ready-mixed concrete plants to acquaint readers with this new source of materials, but particularly to indicate the lay-outs and equipment used. Where a plant is to be permanent much thought goes into its layout and often very helpful ideas that the contractor can use are developed. This does not mean that I think the ready-mixed concrete business is an ideal one as a side line for contractors. It is not. It involves a large investment for equipment and trucks and who are your prospective customers? Your own contracting organization, your competitors who won't buy from you unless they are going to save a large per cent on their own costs, and frequently they don't know what those are, the local utilities, the municipality and a few individuals.

Leave the ready-mixed concrete game to companies organized for that purpose who can develop crews of experts to produce the finest quality of concrete with the best delivery service. It has been suggested that the local materials man is the logical ready-mixed concrete producer, but he is up against the competing material men who want their commission on aggregate and cement sold to the contractor.

The most logically organized and operated ready-mixed concrete company with which I have contacted makes its livelihood on ready-mixed concrete alone. It has an investment of about $150,000 in its plant and trucks, including the capital necessary to keep the plant organization intact during the development period and it buys its aggregates and cement from local dealers in carload lots delivered direct to the plant.

Contractors beware! The heavy investment and difficulty of making profitable customers of competing contractors makes the development of business not an easy matter. Don't forget also that your slack period will very likely coincide with the off-peak of your competitor and then your new project won't help you a bit.

Mixed in Transit or Agitated in Transit?

In answering this question I am purposely omitting any discussion of the individual trucks, but simply confining the question to the working out of the two principles.

Mixed in transit concrete involves a number of trucks each equipped with water measuring devices and each with a driver responsible for admitting just the right amount of water at the correct time somewhere between the plant and the job.

Ready-mixed concrete, agitated in transit sufficiently to prevent segregation during the haul, is a factory made product produced under the absolute control of one expert and is a product of one constantly known quality.

A Producer Summarizes to the Point

After getting my ideas on the subject in order, I popped them on several producers. One successful operator came back with this response to my analysis of the two methods of haul.

"I've got the best set of truck drivers in the country. They can get through traffic like eels, their turn-around on the job is about five minutes, but I wouldn't trust any one of them to mix one batch on the road. That job is entrusted to a technical man who knows his tests of aggregate, cement, moisture content and slump and with his experience can now produce any slump specified within ¼-inch by the feel of the sand and gravel."

Ready-mixed concrete produced under expert technical supervision and agitated in transit is the answer.

What Is Your Experience?

The group I have contracted with does not represent ALL the experience in this field by any means. Whether the reader is contractor, manufacturer, material man, producer, engineer or technologist, I shall gladly welcome discussion of any part or all of this topic whether you agree with my statement or not.

A Notable Program in Pennsylvania

Samuel Eckels, Chief Engineer, Pennsylvania Department of Highways, has literally taken the bull by the horns. When he realized that he faced the biggest year of construction in the history of the State Department of Highways, he called in contractors, material men, surety companies and equipment distributors and told them that, unless everybody got right down to business long before the season started and found out just what they were going to need, placing orders well ahead of time, that it would be absolutely impossible for the contractors to complete the mileage of roads which this year's program calls for.

In this issue of CONTRACTORS AND ENGINEERS MONTHLY, Mr. Eckels tells just how he went about lining up everybody to work with the Highway Department.

Theodore Reed Kendall

Bulldozer

Boosts Shovel *and* Truck Yardage

on Bay State Concrete Job

By Kenneth W. Chase

Resident Engineer
Massachusetts State Department of Public Works

OPPORTUNITIES to improve the location of state highways are constantly being sought and studied by the state engineers. One indication of progress in this field is found in the town of Lanesboro, Berkshire County, Mass. Through this town, the state highway under the old location crossed the Boston and Albany Railroad tracks twice in a distance of less than 2 miles. One was a grade crossing and the other an overhead bridge, itself in need of immediate rebuilding, and dangerous because of abrupt right angle approaches.

As the road was in need of resurfacing, surveys were made to study the possibility of improving the location at the same time. As a result of these studies in the Spring of 1929, the State of Massachusetts awarded a contract to the Lane Construction Corp., to construct a section of highway 9,200 feet in length along an entirely new location, which eliminated both railroad crossings and shortened the length of the route approximately 750 feet.

Excavation

The earthwork was heavy in proportion to the length of the job, there being approximately 44,500 cubic yards of excavation. No ledge was anticipated and none was encountered.

Arriving on the job the contractor first did his clearing, of which there was slightly less than 4 acres, and then laid the pipes which could be best placed ahead of his shovels.

The excavation was concentrated in heavy cuts on the southerly portion of the job, while the northerly portion was swampy and showed very wet sub-soil. Deciding that the job could be opened up more quickly from the northern end, the contractor started a shovel there. An Erie ⅞-yard steam shovel with crawler treads was used. Accompanying the shovel were two Linn tractor trucks.

For two weeks this unit pushed through a section of swamp in which ordinary tired trucks would have been unable to work at any advantage, and throughout this time they averaged nearly 600 cubic yards of material moved daily. As the going improved, trucks were added, and soon after, three steam shovels were at work.

Embankment Construction

The specifications called for making of all embankments in 12-inch layers and rolling each layer. On the large fills a Standard 2-ton tractor with a bulldozer attachment was employed to spread the material in the required layers. This little machine not only cut down the number of men required at the fill but also saved the time necessary for a truck to spread its loads. When the bulldozer was used the trucks could dump their loads in one pile and let the bulldozer do the spreading, making it possible for each truck to make more trips per day. At the completion of the excavation there had been 79 shovel days and 234 truck days or approximately 560 yards per day per shovel and 190 yards per day per truck.

Gravel Subbase

Following the excavation the 12-inch gravel subbase was put in. This was spread in two layers, each rolled, the major portion of this gravel being spread by hand. Toward the last, a Galion Cletrac grader was put on the job and proved to be very efficient and useful in spreading the gravel and in cutting it to a true surface.

Complete Crushing Plant for Aggregate

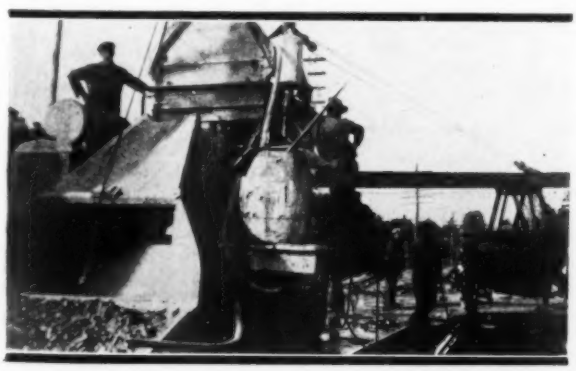
As the gravel subbase neared completion, preparation for the concrete surfacing began. The Lane Construction Corp., had previously been awarded another concrete surfacing job in Lanesboro and had selected as a site for the crushing plant set up a gravel bank situated between the two jobs. Anticipating supplying material for another job in North Adams, in addition to the two projects in Lanesboro, the contractor set up a first-class crushing and screening plant. Test pits in the bank insured an abundance of gravel and the presence of a pond 100 feet away made the site ideal in respect to a water supply for the washing of the aggregate. The plant set up was arranged to operate as follows:

Due to the nearness of the supply a steam shovel and

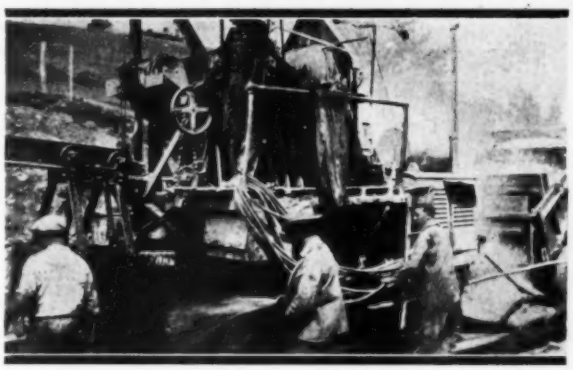
one 5-ton truck were able to supply the plant, dumping the gravel in a bin, the top of which was level with the floor of the gravel pit. The top of the bin was grated with old rail to keep out stones larger than the crusher could handle.

At the bottom of the bin was a sliding feeder which was geared up to work back and forth across an opening at the bottom of the bin. The speed of this motion was regulated by a man at the crusher. This fed the material into a rotary scalper screen which dropped the sand and small stones to a pit below the crusher. Larger material retained on the scalper screen fell into the crusher, passed through it, and landed in the same pit. Scooping up from this was an endless chain of bucket elevators which conveyed the crushed material to the main grading screens. As these buckets dumped, the material was met with a 4-inch jet of water which washed all fine material from the stone. This fine material passed through the ¼-inch openings of the upper end of the screen but did not fall immediately into the sand bin which was located directly below. Instead this portion of the screen was jacketed, the jacket emptying into a chute through which the sand passed to an Acme sand washing rig, from which it was shunted back to the sand bins clear and ready for use. The lower end of the main screen had 2¾-inch circular openings.

Stone passing through these fell directly into the stone bin, while the tailings, which were retained on it, passed down a chute to a belt conveyor which carried them back, emptied into the scalper screen and thence through the crusher again. The space directly below the path of the elevating buckets was boarded up and the spill from the buckets was collected there, which considerably lessened the amount of work necessary to keep the ground clean below. At the bottom of both the sand and the stone bins were Erie AggreMeters which could be regulated to give any desired proportions of batch. These were mounted high enough to permit the passage of large trucks underneath them. Two electric motors supplied the power to operate the plant, one a 50-horsepower motor running the crusher, scalping screen, and feeder, and a 30-horsepower motor running the elevator, main grading screens, washer and tailings conveyor. The electricity was purchased from the local street railway company. The crusher itself was an Acme, Model 11D and a Barnes 4-inch centrifugal pump was used to deliver the water for washing sand and stone.



Pouring Concrete at a Street Railway Crossing



Close Up of the Foote Paver Showing Wet Down of Subgrade and Delivery of Batch to the Skip

CEMENT HANDLING

The cement was all handled at a loading platform located on a railroad siding. The batch trucks after having received their loads from the AggreMeter drove to this platform where the cement was added in the presence of an inspector.

WATER SUPPLY

Preparatory to the commencement of surfacing, the contractor located a water supply for the mixer. A pond near the middle of the job proved to be the solution of this problem, and a Barnes Triplex water pump was installed there. From this, a 2-inch cast iron pipe was laid along the length of the job, with T-joint connections spotted each 200 feet. The mixer was supplied with sufficient hose to reach a connection at all times.

CONCRETING ORGANIZATION

The concrete organization was divided into six individual groups, each group trained to its particular job. These groups were made up as follows:

1. *Steel.* Four men kept ahead making mats of reinforcing steel and distributing them with the dowels and angle bars ahead of the day's pour.

2. *Forms.* Steel forms were used and the crew which set them consisted of 12 men split up in the following manner: 2 men ahead on each side setting the forms roughly to line and grade; 4 men behind on each side spiking the form to the true line and grade. Accompanying these men was a machine grader which did rough grading where needed.

3. *Fine Grading.* The fine grade crew consisted of 5 men. Checking with a scratch board they cut the gravel subbase to the true section between the forms. Accompanying this crew was a 5-ton gasoline roller which compacted the subbase ahead of the mixer.

4. *Mixing and Placing.* The mixing and placing of the concrete was done with a Foote 1-yard batch paver, of the boom and bucket type. Calcium chloride was used in the mix to give a high early strength concrete and this was added to the batch at the mixer in a solution. Mounted on the side opposite the operator of the paver were two 50-gallon barrels in which this solution was mixed in the proportion of two pounds of calcium chloride to one gallon of water. A 6-gallon

The Crushing and Screening Plant

tank was filled from these and emptied into each 6-bag batch of concrete. One man handled this operation, using a small hand pump to fill the 6-gallon tank for each batch. The operator of the paver and one man to dump the batch trucks completed the crew at the paver. Behind the paver two men were employed setting the mats of reinforcing steel, and placing the expansion joints at the end of each 61-foot block. The joint fillers were of the pre-cast type and were set up by use of a steel cap which was depressed slightly below the finished road surface, allowing the screeding machine to run free over the joint. This steel cap insured a perfectly straight joint, and permitted the screeds to go over it, insuring a smooth riding joint. These steel caps were removed by finishers as they came through and before travel was allowed over the road the joints were filled flush to the surface with hot asphalt.

5. *Screeding.* An Ord mechanical screed was used to strike off the concrete to the true surface, an operator and two spreaders attending the machine. It was equipped with two interchangeable sets of blades, one set curved to give a crown section on tangents and the other set straight for use on sections banked for curvature.

6. *Finishing.* Following the screed were three finishers. These men did the belting, tooled the edges, removed the expansion joint caps, finished the joints and finally broomed the surface. Checking with a 10-foot straight-edge they adjusted any slight depressions or high spots which the screed might have missed. Capable and conscientious finishers are invaluable to any concrete organization.

Immediately after the concrete was broomed, it was covered with wet burlap and kept wet for 48 hours. At the expiration of this time the burlap was removed and carried ahead and the concrete kept wet for 48 hours longer. Two men handled the burlap and three waterers kept the concrete wet for the prescribed time.

A driver and two men used a Ford truck with a flat body in doing the many odd jobs incidental to the work. They stripped forms from the previous day's run and distributed them ahead. They removed available burlap ahead, kept the man on the paver supplied with calcium chloride, and so forth, through the day.

PRODUCTION

With this organization between 275 and 285 cubic yards of concrete was poured each 10-hour day and the work progressed smoothly and well. The plant itself supplied aggregate for a total of 20,000 cubic yards of concrete used on the two jobs mentioned. Prevailing good weather, and the absence of any traffic made the working conditions on the cut-off job particularly nice.

PERSONNEL

The work was done under the supervision of George A. Curtis, District Engineer for the State of Massachusetts, with Kenneth W. Chase as Resident Engineer on the job. H. F. Hayden, Superintendent, directed the job for the Lane Construction Corp.

Dam Transforms Former Haunt of Bandits Into Vacation Resort

ONE of the largest and most interesting projects under way in Missouri is that of Lake Lotawana Dam, located near Blue Springs, Mo., about 20 miles east of Kansas City. This section, which was at one time the roughest and wildest area in Jackson County and the lair of looters and bandits, is now, by means of modern machinery, being converted into a vacation resort. When completed, it will have the second largest body of water in the state, and the largest artificial body of water in the vicinity, with 21 miles of shoreline.

The project involves the moving of 300,000 square yards of earth in constructing a dam 1,900 feet long, 470 feet wide at the base, with a maximum height of 55 feet and will impound 4,000 million gallons of water in a 700-acre bowl, the sides of which are rock cliffs and the man-made dam. The contract was awarded to the Martin Day Co., Lincoln, Nebr., in July, 1928, and soon after began the conversion of this tract of forest into an artificial lake.

The lake will extend 6 miles down the valley, spreading out to attain a maximum width of 2½ miles. The site of the dam at the lower end of the lake is the present scene of activity. P & H draglines remove the gumbo earth and place it in 7-yard wagons drawn by Allis-Chalmers Monarch 75 tractors which transport the earth to the spot where it is needed in the rampart. The dam will be of earth with a reinforcement of stone riprapping and across the face of the dam will be placed a treated wire mesh as a protection against burrowing animals.

The Lotawana Dam project is being built by the Lake Lotawana Development Co., Inc., Kansas City, Mo. The Engineer is O. C. Sheley and Guy Smith is Superintendent for the contractor.

Two of the Five Monarch 75 Crawler Type Tractors Operating on Lake Lotawana Dam Project at Blue Springs, Mo., Hauling 7-yard Wagons Being Loaded by Draglines

How the Other Fellow Did It

Construction Briefs

Mailing Tubes Prevent Bonding of Dowels

10. A Massachusetts contractor saw a cheap and easy way out of the requirements that ⅝-inch plain bars used as dowels on transverse joints in Massachusetts must be wrapped to prevent bonding with the concrete. The specifications required that adjacent sections of the pavement, both longitudinally and laterally should be doweled, the longitudinal joints with ½-inch deformed bars, and the transverse joints with ⅝-inch plain bars. The contractor, prior to 1927, kept one man busy wrapping these dowels more or less securely with newspaper to prevent adhesion of the concrete. The superintendent has cut his expense greatly by using cardboard mailing tubes over the rods at a cost of about one cent per tube. The job is neater, more secure and cheaper. 16.2.108

Handling Aggregates for Reservoir Lining

11. When a Pittsburgh contractor was relining a leaky distribution reservoir he maintained his heavy plant on the outside of the reservoir and light equipment inside.

Aggregates for the concrete floor and for the gunite were delivered at the site by truck and stock-piled outside the reservoir. Before guniting began on the first unwatered section of the reservoir 6 inches of 1:2½:4 concrete were placed on top of the existing natural cement concrete base. The 2-inch gunite coat was placed over the entire floor of the reservoir, reinforced with No. 5 steel wire, 4-inch mesh steel fabric, weighing 71 pounds per 100 square feet. This concrete was mixed in a Ransome mixer outside the reservoir and raised to the top of the embankment in a skip operated by a Mead-Morrison hoist. It was dumped on the inside slope into a hopper, which was controlled by a lever convenient to the operator of the Ford dump truck which hauled it to the section being concreted. Three-eighths-inch rods, bent at a right angle at the end, were set on 3-foot centers in the concrete, to which the steel fabric was subsequently attached.

The dry gunite of 2½ parts sand and 1 part cement was mixed outside the reservoir in a Kent mixer of the paddle type and discharged onto a belt conveyor running up over the reservoir embankment. The conveyor emptied into a bin from which the dry mix was hauled to a central platform for storage and from which the pneumatic hoppers of the guniting equipment were filled. 16.1.8

Central Proportioning Plant Uses River Front Dockage

12. The contractors for a section of concrete paving on U. S. Highway 9-E in New York State, established a well-equipped central proportioning plant on the shore of the Hudson River about 2 miles south of the project. This was the nearest point where satisfactory dockage facilities could be created and was used because water delivery of aggregate was much cheaper than handling by freight.

Both sand and stone were unloaded by a crawler-mounted Erie crane with 40-foot boom and Hayward bucket. Cement was also brought in by barge in sacks and unloaded by a small hand derrick and the sacks moved to storage or to the cement sack conveyor by Barrett-Cravens hand trucks. The sand and stone were loaded into the Blaw-Knox bins or to ground storage if the bins were filled. The bins were equipped with batch boxes, which quickly loaded the Mack trucks as they drove under the bins. The trucks then drove to the shed where the cement was added. The cement was run up a conveyor as needed, direct from the hand trucks to a small storage platform, from which the bags were emptied into the batch boxes. When the platform was filled the bags were stored in the cement shed as close to the conveyor as possible. A Unit sack cleaner and baler were a part of the equipment at the proportioning plant. A small Fairbanks-Morse reciprocating pump on skids was mounted near the edge of the unloading dock and was used to supply Hudson River water to the Erie steam crane. 16.1.15

Reservoir Excavation Used to Backfill Outside of Walls

13. A St. Louis contractor hit upon a novel way to handle the excavation within a large reservoir formed by concrete walls and paving of the basin floor. While the excavation of two adjacent walls was in progress considerable earth was removed from the basin by a Russell tractor-drawn elevating grader discharged into bottom dump wagons. About 35,000 yards of earth was wasted outside the basin in a depression which made an ideal site for the deposit of surplus earth. Out of the total of 209,000 cubic yards of dirt removal, this was all that could be wasted as the remainder was needed for backfill around the outside of the walls.

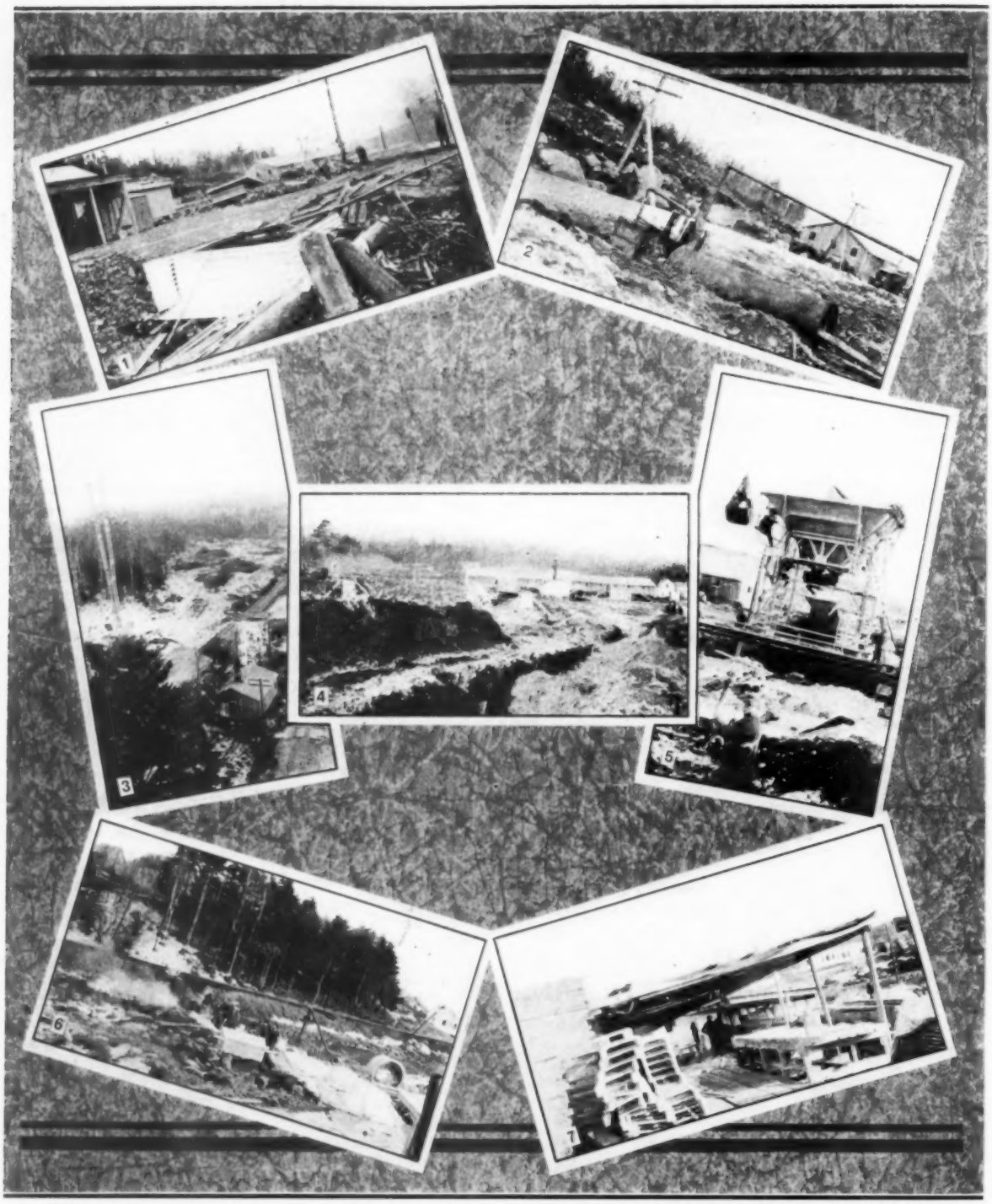
With the completion of the east and north walls, the backfill behind the east wall was undertaken. A belt conveyor 100 feet long, driven by a gasoline engine and mounted on rollers so that it could be moved in either direction was purchased. This conveyor was long enough and inclined at such a slope that the belt conveyor carried dirt over the wall and dropped it on the fill outside. A wooden ramp was built at the inside end of the conveyor containing a trap. Bottom-dump wagons which had been loaded by the elevating grader drove up on the ramp and dropped their loads which were fed on the belt and carried over the wall. In all, this conveyor handled about 175,000 yards of excavation, which is enough to make a backfill behind the wall with a berm at the top at the elevation of the wall coping about 20 feet wide and sloping at a 3 to 1 slope down to the original surface of the ground. 16.3.183

Equipment for Discarding Surplus Sand

14. A sand and gravel company in Massachusetts designed and assembled a sand separator at a cost of approximately $6,500 complete. The saving effected in the operation of rehandling wastes and more than paid for the cost during the first season's use. The sand separator consists essentially of a gravity screen, mounted on a flat car. The material is loaded from the bank to a hopper attached to a flat car and is elevated by a 48-inch pan conveyor. The amount of sand which passes through the screen is regulated by means of a chute mounted over the screen. This chute, 11 feet long and 2 feet wide is mounted at the lower end, but may be raised or lowered at the upper end and in this way adjusted to receive varying proportions of the discharge from the conveyor before it falls on the screen.

The surplus sand passes through the screen into the hopper from which it is fed to a belt conveyor which carries it to a waste heap at the side. The material which is rejected by the screen runs through a chute to a hopper, supported on the flat car from which it can be loaded into the open top car which transports it to the plant. The cars into which the sand is loaded and transported to the plant can be run under the hopper and the sand and gravel is discharged through the six-segment gate arranged so as to distribute the material evenly in the car. 16.2.118

A Notable Winter Job



STARTING A WINTER JOB AT BUCKSPORT, MAINE, WHERE THE MORTON C. TUTTLE COMPANY, BOSTON, HAS BEEN BUILDING A LARGE PAPER MILL FOR THE MAINE SEABOARD PAPER CO.

1. Ten Sullivan Rotator hammer drills were used for driving the holes for blasting out 22,000 yards of rock. The compressed air was heated in a 4-inch coil by a wood fire. 2. Water supply for the steam shovels was heated as shown. 3. Aggregate handling and mixing layout. A 4-car thawing shed permitted frozen aggregate to be unloaded by the derrick at left. 4. Excavation for the foundation walls. When concrete could not be poured the same day, the trenches were filled with hay over night to keep out the frost. 5. The concrete mixing plant showing the 125-ton Erie AggreMeter plant and Koehring ¾-yard mixer. 6. Culvert construction. 7. The lumber yard and saw mill with a roof over the makeup benches and saw mill to protect the carpenters.

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

When a Partner Is Not a Partner

"We are going to hold you liable for materials that were sold on the credit of your old firm," declared a lumber company to a citizen of Arkansas.

"Sez you!" answered the c. of A.

"Sez me," replied the l. c.

That is the substance of what passed between the parties to a lawsuit lately before the courts of Arkansas, although the precise wording of the dialogue above given is imaginary.

The lumber company had had dealings with a partnership and assumed that there had been no change in the firm when it sold and delivered a bill of material. But it seems that one of the partners had withdrawn in the meantime. However, no notice of dissolution had been given the lumber company. Failure to give that notice rendered the retiring partner liable on the bill, the Arkansas Supreme Court held in the case of East Arkansas Lumber Co. vs. Beard, 14 S. W. 2d, 224, decided February 11, 1929.

This decision does not mean that a retiring partner is necessarily liable to creditors of the new business who had had no dealings with the old firm. But it does mean that if a retiring partner fails to apprise people dealing with the old firm that there has been a dissolution and if they reasonably continue to extend credit on the faith of the continuance of the partnership they can hold the retiring member liable.

Default in Paying Installment Permits Subcontractor to "Strike"

The right of a subcontractor to refuse to proceed with work on the contractor's refusal to pay a matured installment was reaffirmed by the Appellate Division of the New York Supreme Court in the case of Parisi vs. Hubbard, 235 N. Y. Supp. 220, in an opinion filed June 5, 1929.

Owner Can Recover Payment After Acceptance of Job If Defect Was Latent

A concrete sidewalk was built by a contractor and was accepted and paid for by the owner. But about three or four months later it commenced to crack and then it became apparent that the walk was worthless.

In a suit by the owner to compel either return of the money paid or rebuilding of the sidewalk, the contractor insisted that the owner's acceptance of the job after inspecting it, and his payment, precluded further claim. But the Louisiana Court of Appeal said in his case (Delaney vs. Morter, 123 S. R. 517):

"It is true that, as a matter of law, if one inspect and approve work done and pay the price, he cannot subsequently recover the amount on the ground that the work was not done according to specifications. But that rule applies only in cases where the owner has ample opportunity to discover the defects in the work previous to the approval and payment. The rule does not apply in cases like this, where the owner has no knowledge of the construction of sidewalks or of the mixing and laying of concrete, and where the defects cannot be discovered on bare inspection. The testimony shows that the defects in a concrete walk do not appear until the concrete has 'set,' which ordinarily takes some time. When the work in this case was done, it appeared to be up to standard."

What Can a Dismissed Contractor Do?

Usually when some one steps on our toes—legally speaking —the law allows but one course to be pursued by the injured party. But some legal wrongs give a choice of courses. An example of this right to choose arises when a contractor is discharged without good cause. He can look into his pocketbook and figure out just how many dollars and cents he is loser as a result of the dismissal and sue for that amount. In other words, he can sue for damages for breach of the contract. The amount of his recovery would be arrived at by taking the contract price as a basis and deducting from it what it would have cost him to do the whole job.

The other course is to treat the situation the same as if there never was a specific contract as to how much he was to receive for doing the work. That entitles him to recover the fair value of the work he has done. The theory of the law on this view of the case is that if the owner wrongfully terminates the contract it would be unjust that he rely upon it as denying to the contractor reasonable compensation for work done before the dismissal.

But unless the contract fixes a low rate of compensation the first course is usually the better one, because it gives the contractor recovery for loss of profits on the unperformed work, while the second course gives pay only for such work as has been actually done. So, naturally the choice of courses will usually depend upon which is the more favorable rate of compensation for the contractor—the contract rate or the going price for the kind of work that was actually done.

The foregoing remarks are inspired on reading the decision handed down by the Springfield, Mo., Court of Appeals in the case of Ott vs. Moore, 20 S. W. 2d, 166, decided September 23, 1929. It was declared by the court that a contractor who had been employed to move houses, but who was wrongfully dismissed by the owner, could either claim damages resulting from the owner breaking the contract, or could claim the fair value of the work done up to the time of his being "given the air."

Cost of Replacement Is Not the Proper Measure of Damages for an Injury Subject to Repair

Highway contractors in blasting for a road damaged the roof on plaintiff's nearby garage. But, although six years old, the roof was previously in good condition and the damage done by the flying rock could be repaired. Under such circumstances, the Kentucky Court of Appeals decided in the case of Ben Gorham & Co., vs. Carter, 14 S. W. 2d, 749 (February 29, 1929) that plaintiff failed to make proof warranting judgment in his favor. The court said:

"The testimony tended to show the cost of replacement with a new roof, but did not show the probable cost of repairing it so as to restore it to the condition prevailing prior to the injury. Plaintiff was not entitled to a new roof for the damage done to his old one, but he was entitled to recover damages adequate to repair and restore the roof. It is settled by the authorities that an injury to a structure capable of reasonable repair is fully compensated by a sum sufficient to make the repairs."

Contractor's Liability to Trespassers

A temporary toilet building was placed over a sewer manhole in a residential street in Cleveland, for use by a crew working in the street. Plaintiff, a salesman having no relation to the job, unauthorizedly made use of this structure. In lighting a cigarette, he ignited gas that was escaping through the manhole, and sued the company in control of the structure for resulting injuries.

In an opinion filed May 1, 1929, the Ohio Supreme Court decided that plaintiff could not recover damages, because he was a trespasser and there was no negligence on defendant's part toward him. (Van Benschoten vs. Cleveland Electric Illuminating Co., 166 N. E. 374.) The court remarked:

"Had the case been one where children of tender years had been attracted to the building and become injured in the same manner the principle of attractive nuisance might apply, and the defendant become liable, if it knew that children were accustomed to play in the vicinity of the building and that danger might result to such children from a similar use. . . .

"The building was not erected for the use of the public. The defendant did not know that the plaintiff was in its vicinity, consequently the plaintiff was neither an invitee or licensee, but a trespasser, upon the defendant's property. . . .

"There is nothing in this record disclosing a state of facts whereby an ordinarily prudent person could reasonably have anticipated or foreseen that plaintiff would use the building for a viatic purpose, that he might ignite the gas by a lighted match, or that an injury would probably result."

Workman Who Had Equal Means to Know of Risk Cannot Recover Damages for Injury

Dealing with the right of an injured workman to recover damages, as distinguished from an award under a Workman's Compensation Act, the Georgia Court of Appeals lately (August 23, 1929) adjudged that if the workman, in entering upon employment on certain premises, had means at least equal with the owner and the employer to determine the condition of the premises no action could be maintained against the owner or the employer on account of defective state of the premises. (Bryan vs. Moncrief Furnace Co., 149 S. E. 424.)

When Are Carload Shipments of Material "Delivered?"

"While we were unloading that car of tile that you sold us, a switch engineer stepped on the accelerator of his engine instead of the brake and bumped the car so hard that some of the tile were broken," complained the buyer. "Certainly, you do not expect us to pay for those that were broken."

"We are sorry that the tile were what they were cracked up to be," replied the seller, "but they were all right when we shipped them, and we are not liable for this breakage. You must look to the railroad company for reimbursement against the loss."

"But the tile were sold to us 'delivered,' not f. o. b. your factory," rejoined the buyer. "That made the railroad company your agent."

"True," admitted the tile company, "the railroad company was our agent for the purpose of transporting the tile and delivering it to you, and if you can show that any of the tile were damaged in transit, we will make the loss good and go after the railway company. But the car had been delivered to you, and your men had unloaded part of the contents before the switch engine rammed the car. Therefore, we fail to see why we are liable to you for the breakage of which you complain."

Litigation ensued and an appeal carried the case before the Michigan Supreme Court. In an opinion handed down by that tribunal October 7, 1929, the controversy was decided in favor of the tile company, on the ground that the breakage occurred after delivery to the buyer. (Kalamazoo Tank & Silo Co., 226 N. W. 832.)

Bond Clause Had an Unexpected Effect

"We will drill a well for you and assure a certain minimum pumping capacity," was the principal undertaking entered into by a company in dealing with a city in Iowa. The company may have felt that it was fortunate in securing a contract that specified no time for completion of the well. But apparently it overlooked the full importance of a clause in a bond that it gave the city to secure performance of the contract. That clause read: "No claim, suit or action shall be brought against the principal or surety after the 31st day of December, 1926, nor shall recovery be had for damages accruing after that date." The contract was entered into March 13, 1925.

A well was drilled, but it failed to produce as required by the contract and work was suspended. Then followed dickering for an adjustment of the matter, but the negotiations failed, and the company wired the city on November 29, 1926, that the work would be resumed. But the city treated the contract as broken and sued to recover all the money that it had paid on the contract as the work progressed. The contractor took no steps to renew the bond.

In an opinion handed down by the United States Circuit Court of Appeals, Eighth Circuit, September 11, 1929, it was held that the city was entitled to win the lawsuit. The Court said that the contract and bond read together must be deemed to mean that the contract should be fully performed not later than December 31, 1926. At least by failing to renew the bond, the contracting company precluded itself from claiming any further time in which to finish the job according to contract. (Layne-Bowler Chicago Co. vs. City of Glenwood, 34 Fed. 2d, 889.)

Contractor's Sureties Were Released by an Extension of Time for Paying for Material

A building contractor in Los Angeles gave a statutory bond to secure payment for labor and materials, but a lumber company which furnished materials to him on open book account extended the time for paying the account, accepting a secured note payable in 90 days. This extension of time for payment, which was made without the assent of the sureties was held to release them from liability to the lumber company in an opinion handed down by the California District Court of Appeal in the case of Hammond Lumber Co. vs. Richardson Building & Engineering Co., 278 Pac. 261, finally disposed of June 29, 1929. The court held that the case was governed by the general rule that "where the creditor grants the debtor an extension of time without the consent of the surety, the latter is released."

Right to Recover an Erroneous Payment

"Gone forever!" That is what ordinarily happens when money is paid out voluntarily in private business transactions without any element of fraud or mutual mistake inducing the payment. A person who thinks he has been taxed too much by the public authorities may pay taxes "under protest" and thereby protect his right to sue to recover the excess. Or one who has been defrauded by the payee into paying too much, or who has overpaid through a mistake as to the amount due—especially if the mistake be the fault of the payee—may compel repayment. But one who has ample opportunity to know just how much he owes has no right voluntarily to pay more with an expectation that he can compel restoration of the excess. He cannot preserve that right by marking his check for the original payment "paid under protest."

Attention to this subject is directed by a decision of the Iowa Supreme Court, where a buyer of goods paid numerous bills in full and then later made a futile attempt to claim credit against unpaid bills for part of the payments made on the old bills, under a contention that such items of payment were not actually owing. The buyer had ample opportunity for knowing just what he owed and if he paid more he must be deemed to have voluntarily given the excess to the payee. (Meyer vs. Gotsdiner, 226 N. W. 38, decided June 24, 1929.)

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New System of Concrete Tank Construction Used in Midwest

Office of Druar & Milinowski

FOR a number of years DRUAR & MILINOWSKI, consulting engineers, 500-505 Globe Building, St. Paul, Minn., have been interested in the problem of improving elevated concrete tanks for water storage. They have obtained satisfactory results by using the Hewett method of construction.

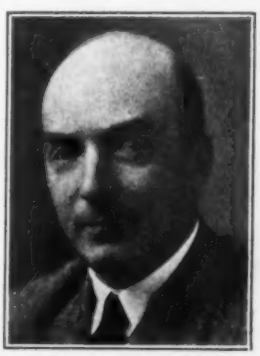
J. F. Druar

The first tank of this type was built at Barnum, Minn., and since then Druar & Milinowski have built others and recently let a contract for a 100,000-gallon tank on a 100-foot tower for the village of Park Rapids, Minn., to cost $15,900. The decision of the village council of Park Rapids to build such a tower and tank was reached after all members had viewed the one recently built under the direction of the same consultants at Osseo, Wis. The officials were impressed with the fact that the structure, which is to be built in a prominent position, would be of a pleasing type, would require little upkeep expense, such as periodic painting, and would do away with the necessity of building a separate pump house as the two municipal wells and the entire pumping equipment could be located in the base of the tower. The beauty of the structure can be further accentuated by the planting of Engelmann ivy, allowing it to cover portions of the tower wall. A movement is also on foot to make this structure a soldiers' memorial by attaching a suitable tablet.

The principle feature of the Hewett method is that the shell of the tank is constructed without reinforcement and thereafter banded with steel rods or hoops which are given an initial tension of approximately 15,000 pounds per square inch by means of turnbuckles, thereby placing the concrete of the tank shell in compression amounting to several hundred pounds per square inch. It is found that when tanks of this kind are filled with liquid, the initial compression in the concrete is reduced, but never entirely overcome. In other words, the concrete remains in compression, even after the liquid load is applied to the structure. The result, therefore, is that the enlargement of the diameter of the tank due to the water load is reduced to a minimum and, as a matter of fact, is only about one-tenth of the amount that would be expected in a similar tank constructed according to the current method or if metal reinforcement is imbedded directly in the concrete shell. After the hoops have been tightened an outer shell of concrete is applied to the rods for their protection. The orginator of this method has designed, since the first tank was built at Barnum, ten or twelve such structures for water, oil and gasoline storage. Some of these have a capacity of 2,000,000 gallons. The Osseo tower and tank cost $14,790.

The water for the village of Osseo, Wis., is soft, but contains 4 p.p.m. of iron and 0.2 parts of manganese and about 50 parts carbon dioxide. Preliminary tests showed that æration followed by a short contact period and rapid sand filtration would reduce the iron contents a satisfactory limit and the plant was designed along these lines.

The entire plant is housed in the base of a 22-foot concrete tower on top of which the water storage tank mentioned above is located. The raw water from a deep well is pumped through a small enclosed ærating device within the pump room, in which it is forced to trickle over a number of trays built up of wooden slats and flows into a basin beneath the pump room floor. From this basin the water is pumped through two circular steel pressure filters to the storage tank or the distribution system of the village. The iron content is by this process reduced by 0.2 p.p.m. and the manganese is entirely eliminated. The cost of the entire removal plant, including the pumps, filters and aerator, was $2,700.



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Municipal Construction in Arkansas

IN a recent report Leonard N. White, Secretary-Treasurer, DICKINSON & WHITE, INC., 7th floor, Rector Bldg., Little Rock, Ark., states that his firm is now occupied with plans and reports on sewerage and water works systems for Mulberry, Ark.; a sewerage system and paving program for Booneville, Ark.; a paving project in Earle, Ark.; a sewerage system and water works in Green Forest, Ark., and a paving program in Little Rock, Ark. This company has also been called upon for expert testimony on several miscellaneous matters.

Consulting Briefs

Walter A. Shaw, 30 N. La Salle St., Chicago, Ill., reports that he is working on the preparation of plans in behalf of the villages of Kenilworth, Winnetka and Glencoe, and the city of Highland Park, for the separation of all grade crossings over the Chicago & Northwestern Railroad and the Chicago, North Shore & Milwaukee Railroad. These two roads parallel each other.

Rudolph P. Miller, 101 Park Ave., New York, is now preparing plans for a building code for the city of Rochester, N. Y., the revision of a recommended building code of the National Board of Fire Underwriters and a housing code for the New York State Housing Board.

H. F. Tucker, consulting engineer, 1934 14th Ave., No., Seattle, Wash., is making preliminary studies for a proposed bridge across Lake Washington, Seattle, Wash. It is estimated that this bridge, which will have a total length, including approaches, of about 6,000 feet, will cost $4,000,000. The center span clearance above the lake is to be 135 feet and the maximum depth of water is 133 feet.

John M. Rice, 247 Oliver Bldg., Pittsburgh, Pa., reports that he is now engaged on plans for sewage treatment plants for Mercer and Brentwood, Pa., and is also preparing a report on grade crossing elimination at Homestead, Pa. He is appearing as an expert witness in the rate case for the Johnstown Telephone Co., and in cases connected with construction and land development projects and highway work in Pittsburgh, O'Hara Township, and Springdale Township, Pa., and Steubenville, Ohio.

John M. Rice

Walter J. Lehner, Ullrich Bank Bldg., Mt. Clemens, Mich., is now engaged on reports and plans for a new trunk sewer system and pumping station for the village of St. Clair Shores, Mich., which it is estimated will cost in the neighborhood of $1,795,000. The organization is also working on plans for a new water system for the village of Fraser, Mich., to be constructed at an estimated cost of $70,000. George Wealton and Gerald P. Denicke have recently joined the staff of Mr. Lehner.

Walter McCulloh, who formerly maintained a consulting practice at 406 Gluck Bldg., Niagara Falls, N. Y., retired from private practice on September 1, 1929, and is now Engineer of Construction and Maintenance, Department of Education, Niagara Falls, N. Y.

John R. Nichols, 45 Newbury St., Boston, Mass., is now working on plans for a new hospital at Springfield, Mass. He has completed the preparation of plans for a new boiler house for the Mallinckrodt Chemical Works of St. Louis, Mo.

Charles Brossman, consulting engineer, 1009-1010 Chamber of Commerce Bldg., Indianapolis, Ind., is preparing plans for a program of sewage treatment works, water works and a new dam for Batesville, Ind., a sewage treatment plant for Union City, Ind., and preliminary data for a sewage treatment plant for Lawrenceburg, Ind.

Specialists in Flood Control, Drainage and Reclamation

Arthur E. Morgan

A REPORT from the office of the MORGAN ENGINEERING CO., Ludlow Bldg., Dayton, Ohio, states that this office is now engaged on plans for a $3,000,000 flood control project for Springfield, Ohio; and is consulting engineer on a $12,000,000 flood control project for the Middle Rio Grande Conservancy District, as well as supervising construction on a 9-mile, 18-inch steel water pipe line with wells and pumping plant for Bradford, Pa.

This company specializes in flood control, drainage and reclamation work and related problems of hydraulics and water control. They also serve as expert witnesses and advise financial interests in this field.

Recent additions to the staff are C. H. Shea and C. W. Ullom, both of whom are Associate Members of the American Society of Civil Engineers.

Large Sewer Program Among Activities of Warren & Van Praag

A SEWERAGE system for the city of Decatur, Ill., involving the construction of 15 miles of sewers ranging in diameter from a minimum of 8 inches to a maximum of 84 inches, and costing approximately $680,000, is one of the projects now under way under the supervision of WARREN & VAN PRAAG, INC., 415-418 Milliken Bldg., Decatur, Ill. This system of sewers, known as the Southeast sewer improvement, and similar to the North Side sewer improvement placed under construction in 1925, is also designed to serve a rapidly developing residential district covering 1,200 acres.

A third and larger improvement which it is expected will be placed under construction early in 1930, has been planned by this organization. This is known as the Central Relief sewer improvement, and is to be a system of large-diameter sewers which will serve as relief for the present system of sewers, now badly surcharged at frequent intervals. The area to be served by this relief sewer comprises 2,300 acres, and includes the entire business or commercial center of the city and the major industrial areas, as well as a large acreage of the most densely built-up residential areas. The proposed sewers will range from 24 to 108 inches in diameter, and in addition there will be constructed a rectangular box sewer section having inside dimensions of 10 by 12 feet. In all, there will be 12.2 miles of relief sewers constructed, designed to meet the requirements of the area served for a period of 50 years. They will be financed by a special assessment against the benefited property. The estimated cost of the proposed improvement is $2,145,570.38.

Another sewer project under the supervision of this organization is the Sewer District No. 3 at Hillsboro, Ill. They are also supervising the construction of the Exchange Street Paving improvement at Danvers, Ill.

Among the litigation on which they have been called to give expert testimony is the case of the Madison Coal Co. vs. Geo. R. Brown, Divernon, Ill., and that of the C. I. P. S. Co. vs. Kincaid Land Owners, on the Kincaid Dam case at Kincaid, Ill.

H. W. Bush, who is acting as Resident Engineer on the Southeast sewer improvement at Decatur, Ill., described above, has recently joined the staff of this organization.

Engineering Consultants Publish Illustrated List of Projects

THE office of FAY, SPOFFORD & THORNDIKE, Engineers, 44 School St., Boston, Mass., has recently distributed an attractive brochure containing a partial list of projects on which this organization has been in responsible engineering charge. It includes a group of bridges, water supply and sewerage projects, ports and terminal work, other buildings and miscellaneous engineering undertakings with brief descriptions of the various work and copious illustrations showing the extent and type of project mentioned. In the back of the brochure are cards of various contractors and material supply houses.

Erik Floor Returns to Active Work with Harza

AFTER an absence of fourteen months Erik Floor, principal assistant to L. F. HARZA, consulting engineer, 205 West Wacker Drive, Chicago, Ill., and Sault Ste. Marie, Ontario, has returned to active work. Mr. Floor was severely injured by a fall on a construction job on which he was engaged but has fully recovered.

This firm is now preparing reports and plans on several hydro-electric projects in the southwest and several in Ontario, Canada. Work now under way under their supervision includes a hydro-electric development for the Algoma District Power Co., Canada. This project also includes three large storage dams.

Street Lighting System Among Plans of Randolph-Perkins Co.

AN ornamental street lighting system for the city of Highland Park, Ill., zoning surveys and city plans for the cities of Moline, East Moline and Silvis, Ill., the design and supervision of construction of an hydraulic dredge at Libertyville, Ill., and the design and supervision of construction of an Ambursen type dam and artificial lake at Ringwood, Ill., are among the projects for which reports and plans are being prepared by the RANDOLPH-PERKINS CO., Room 1444, 33 S. Clark St., Chicago, Ill.

Underwood & Underwood

Robert Isham Randolph

This company is acting as an expert witness in the case of New Jersey against the State of New York to restrain the diversion of waters of the Delaware River.

Contract Let for $250,000 Sanitary Sewer

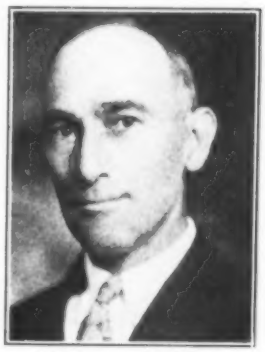
PLANS for a $250,000 sanitary sewer for Robbinsdale, Minn., were drawn by J. E. Carroll of Claussen & Carroll Engineering Co., Ltd., Metropolitan Bank Building, St. Paul, Minn., during December, 1929, and a contract was let on January 10, 1930, to O'Neil & Preston who started work during February.

Mr. Carroll says that there seems to be more activity and interest in municipal improvements at this time than at any other during the past five years. Credit for arousing this interest and activity, he believes, is due to President Hoover's effort to bring about more employment, thereby keeping the industries busy, so that general prosperity and not local, will prevail.

Oscar Claussen, senior member of Claussen & Carroll Engineering Co., has retired from active practice. He still retains his membership and interest in the Metropolitan Drainage Commission.

Ferry Terminal and Sewage Disposal Plant

THE staff of KASTENHUBER & ANDERSON, civil engineers and surveyors, Easton, Md., is now working on reports and plans for the Annapolis Ferry Terminal on Kent Island, Md., for the Claiborne-Annapolis Ferry Co., and on an enlargement of the Easton, Md., sewage disposal plant.



E. G. Kastenhuber, Jr.

Work now under way under the supervision of this organization includes sewer extensions and pavement construction in Easton, Md.; a private beach protection project on the Tred Avon River for S. N. Hersloff; a private wharf and channel on the Choptauk River for R. W. Marshall and miscellaneous surveys.

Walter F. Moore has recently joined the staff as principal assistant engineer, and Mrs. Alice Webster Wood as Secretary.

Logging Railroads and Trestles

ACCORDING to a statement from W. Bollons, Jr., Secy., BOLLONS & PINKNEY, INC., Civil Engineers, 502 Lumbermens Bldg., Portland, Oregon, his firm is preparing a report on a logging railroad trestle 600 feet long and 175 feet high to eliminate 27,000 cubic yards of grading and 500 feet of pile trestle, as well as 37 stations of operating line; and another report on a logging incline 3,400 feet long on a maximum grade of 80 per cent, including preliminary and location surveys of 11 miles of main line railroad. A further report on the feasibility of two logging operations aggregating 32,000 acres of timber is under preparation. They are at present supervising the construction of 18 miles of logging railroad.

This organization represented the East Side Logging Co., in the case of the Mayer & MacMillen Construction Co. vs. East Side Logging Co. A decision in favor of the logging company has recently been handed down by the Oregon Supreme Court. The East Side Logging Co., entered into a contract with Mayer & McMillan for the construction of approximately 4 miles of logging railroad grade, on which the material was to be classified as common, medium, and solid rock, for which the price agreed upon was to be 40 cents, 60 cents and $1.10 per yard respectively.

The railroad in question was constructed in Columbia County, Oregon, where the character of the cuts consisted of a top soil of from two to several feet of earth, and then merging into a more difficult substance. Most of the witnesses were uncertain as to the geological name of the latter, which later was classified as a soft sandstone formation or shale. No well-defined strata were encountered, but rather the soil merged into harder material toward the bottom of the cut until it reached a condition where the contractor's witnesses felt justified in calling it rock, although admitting it was not geologically a solid rock. The substance soon disintegrated upon removal and exposure to the weather.

Both parties agreed to abide by the decision of the Chief Engineer, W. Bollous, in any dispute which might arise between the company and the contractor. Upon completion of the work the contracting company alleged error in the segregation of the yardage, but no complaint was made as to the gross amount removed. The plaintiff-company claims to have removed 15,234 yards of earth, 32,983 yards of medium, and 27,618 yards of solid rock, while the engineer allowed 60,039 yards of earth, 15,447 yards of medium and 349 yards of rock. It will be noted that the total yardage is the same in both cases, namely, 75,835 yards.

The case was tried in the Multnomah County Court, before Judge Tucker, who supported the claim of the contracting company in part, allowing them $47,112.19, against the demand of plaintiff for $56,253.20.

Mr. Bollon's estimate for the job, based upon his classification, was $32,938, upon which the logging company paid $29,018.01, leaving a balance of $3,919.99 pending settlement of the dispute. Since the balance was retained percentages, it could not be paid pending settlement of the dispute.

Both the logging company and the contracting firm appealed from the decision of the lower court, with the result that the award of the lower court was entirely set aside, with the opinion that the evidence did not support the claim of the contracting company that solid rock was encountered to the amount set forth in the complaint in view of the fact that little powder was used in many of the cuts where solid rock was alleged. The engineer's classification was sustained by other witnesses.

C. L. Wooldridge, Inc., Employs Antioch Graduate

IN September, 1929, Charles L. Wooldridge, Jr., a graduate of Antioch College, Class of 1927, joined the staff of CHARLES L. WOOLDRIDGE, INC., Fulton Bldg., Pittsburgh, Pa.

This organization offers consulting service only and does not supervise any construction. They are now supervising the planning of Mt. Lebanon High School at Mt. Lebanon, Pa.; the Washington High School at Washington, Pa.; the Taylor Alderdice High School addition and the Arsenal Junior High School for the School District of Pittsburgh; and are consulting engineers for the Pittsburgh Medical Center.

Southern Water Works Reports

THE engineering firm of HENRY A. MENTZ & Co., engineers, Hammond, La., and McComb, Miss., are working on reports and plans and specifications for a water works and fire defense system for the East Jefferson Water District No. 1, at Kenner, La., which will cost approximately $1,250,000. They have just completed a $100,000 sanitary sewerage system for the town of Tallulah, La., and are now engaged in a million dollar paving program for the city of McComb, Miss.

Henry A. Mentz

Otto G. Frick, formerly designing engineer with the Shell Petroleum Corp., Norco, La., has recently joined the Mentz staff.

Variety of Work Under Way by Westcott & Mapes

REPORTS and plans which WESTCOTT & MAPES, INC., 139 Orange St., New Haven, Conn., are now working on include the design of the New Haven Municipal Airport; a boiler plant for the Terry Steam Turbine Co.; an industrial plant for the Toledo Scale Mfg. Co., comprising structural design, heating and ventilating equipment, electric lighting and power units; additions to the present factory of the G. & O Manufacturing Co., at New Haven; design of the foundations for the Cleveland Town and Country Club, as well as the structural steel frame, heating, ventilating and refrigeration equipment and the electric light and power for the building; design of the heating, ventilating, electric light and plumbing systems for the Spring Glen Club of New Haven; and an addition to the factory of the Geometric Tool Co.

Among the projects now under way under the supervision of Westcott & Mapes are a steam electric power plant and equipment for the United Illuminating Co., New Haven, with a capacity of 50,000 kilowatts; a new steam electric power plant addition for the United Illuminating Co. at Bridgeport; a boiler plant for the Terry Steam Turbine Co. and work at the New Haven Municipal Airport.

Reports on Oklahoma Drainage Districts

REPORTS for the Newalla, Okla., Drainage District, and the Lindsay, Okla., Drainage District, as well as plans for a new water supply for Avard, Okla., are being prepared by MORRIS C. BURKE, 406-7 Terminal Bldg., Oklahoma City, Okla. Mr. Burke is supervising construction on an earth-fill dam in Oklahoma County, for which Perry Whetstone is owner, and on another earth fill dam in the same county for which Frank Vrana is the owner.

Mr. Burke has also been called upon to give expert testimony in the cases of Wintermute vs. Oklahoma State Highway Department; City of Blackwell, Okla., vs. Treadway; and the B. M. & E. R. R., vs. R. F. Baker, et al.

Large Building Construction Projects for Pennsylvania Railroad

SUPERVISION of the construction of a large warehouse and cold storage building for the Pennsylvania Dock and Warehouse Co., in Jersey City, N. J., and break bulk facilities for the Pennsylvania Railroad in Jersey City is in the hands of F. H. McGRAW & Co., engineers and constructors, 51 East 42nd St., New York, who also have charge of the construction of a blooming mill, plate mill and sheet mill for the Gulf States Steel Co., of Birmingham, Ala.

Plans on which this organization are working include a railroad location project near Zanesville, Ohio; a steel mill location near Detroit, Mich.; a power plant extension for Gadsden, Ala.; and preliminary studies for a large recreation building for New York City.

The officers of F. H. McGraw & Co. are F. H. McGraw, Pres.; J. C. Boyd, Vice-Pres. and Treas.; H. A. Brinkerhoff, Vice-Pres., and H. E. Smith, Secy. Among other members of the organization are George Burgess, A. C. McNulty, T. O. Brown, P. Clow, H. Dowie, J. A. Stitt and John J. Lydon.

Reports on Resistance to Earthquake Damage

A REPORT on the "Effects of Earthquakes on Dams" is in preparation by WENDELL M. BUTTS, consulting structural engineer, P. O. Box 339, San Diego, Calif. Mr. Butts is also preparing reports for the Board of Fire Underwriters of the Pacific on the resistance to earthquake damage of various buildings, including the Subway Terminal Buildings, the Edwards & Wildey Bldg., the Fine Arts Bldg., the Union Bank Bldg., and the Security Title Bldg. in Los Angeles; the Electric Bldg., Station B of the San Diego Consolidated Gas & Electric Co., and the Marston Bldg., in San Diego.

This firm is also supervising the construction of a High School in San Diego and is preparing the structural design for the Union-Tribune Bldg., a $500,000 newspaper plant in San Diego.

Conard Inspecting Pipe for Several Large Projects

REPORTS on water works properties in the states of New York and New Jersey are now being prepared by WILLIAM R. CONARD, 321 High St., Burlington, N. J., for private interests. He is also engaged in the inspection of materials for a new water supply for Albany, N. Y.; the Wanaque water supply pipe line of the North Jersey Water Supply Commission; a standpipe for Scarsdale, N. Y.; a standpipe for the Pennsylvania Water Co.; a steel pipe line for Newark, N. J., a water supply line for the City of Springfield Mass.; and water pipe line materials for the Mahoning Valley Sanitary District, Youngstown, Ohio. Until late in 1929 Mr. Conard was associated with J. S. Busby.

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Construction Industry News

National Equipment Corp., Milwaukee, Wis., has announced the addition to its group of C. H. & E. Manufacturing Co., Milwaukee, manufacturers of saw rigs, pumps, hoisting machinery, material elevators and mortar mixers. Frank F. Hase, one of the founders and President of C. H. & E. has been made a Vice President and Director of the National Equipment Corp.

United States Pipe & Foundry Co., Burlington, N. J., has announced that in addition to manufacturing deLavaud pipe in thicknesses and weights prescribed in United States Government specifications, it is also manufactured according to American Water Works Association and American Gas Association specifications as well as in any special thickness or weight which may be required.

Central Foundry Co., New York, has announced the appointment of Leonard W. Saine as General Manager of Sales for the Universal Pipe Division. Mr. Saine, who was the company's representative in the South for a number of years, succeeds Robert W. Conrow and will make his headquarters at the general offices of the company in the Graybar Building, 420 Lexington Avenue, New York.

L. W. Saine

Bay City Shovels, Inc., Bay City, Mich., has announced the following changes in personnel: C. C. Johnson, formerly connected with Osgood Co., has been appointed District Sales Manager for Bay City shovels in charge of Indiana and Ohio territory. C. H. Collier has been appointed District Sales Manager for the entire state of Texas, with offices in the Burt Building, Dallas, Texas. R. D. Allrich, formerly of Chicago, is now located at the factory office in Bay City as Agency Sales Manager in charge of all distributors in the Central District. The Eastern Contractors Equipment Co., Frederick, Md., has been made exclusive Bay City distributors for Maryland.

W. A. Riddell Co., Bucyrus, Ohio, has announced the sale of its North Little Rock, Ark., branch to the Southwestern Equipment & Supply Co., Market St. and Broadway, Little Rock, Ark. The sale involves all of the physical equipment of the branch as well as the exclusive sales right of Warco equipment in the state of Arkansas. The Southwestern Equipment & Supply Co. is a new organization, under the management of T. B. Cooper, and will carry a complete line of Warco machines and repair parts to insure prompt and efficient service. O. E. Tapley, formerly Manager of the branch, will serve as field representative for Riddell in the southwest, including Arkansas and adjacent territory.

C. F. Pease Co., Chicago, Ill., has recently announced the appointment of W. Earle Pashley, Advertising Manager, to the position of Assistant Sales Manager and Second Vice President. Simultaneously with that appointment, Mr. Pashley was elected to the Board of Directors and in addition to his new duties will continue in charge of advertising and all promotional activities of the company.

Wood Hydraulic Hoist & Body Co., Detroit, Mich., recently purchased the property and assets of the Hydraulic Hoist Manufacturing Co., St. Paul, Minn., manufacturer of St. Paul hoists. The business of the company will continue under the same management and St. Paul hoists and bodies will be marketed through the same dealer organization which has handled them in the past. Plans are in effect to build a body plant at St. Paul or Minneapolis to take care of the requirements for bodies specified for shipments with hoists. The plant will concentrate on a standard line of steel dump bodies particularly for use with the St. Paul hoist. The name of the company has been changed to the St. Paul Hydraulic Hoist Co.

The Trackson Co., Milwaukee, Wis., has recently announced the appointment of the J. D. Adams Co., Indianapolis, Ind., to handle Trackson equipment for McCormick-Deering tractors in the territory included in the Indianapolis, Fort Wayne, Richmond, Terre Haute, and Evansville, Ind., branches of the International Harvester Co., as well as the Louisville, Ky., branch. McCarthy-Jones & Allen Co., Inc., Nashville, Tenn., has been appointed Trackson distributor for the Nashville territory and the Option Equipment &Supply Co., Mt. Oliver Station, Pittsburgh, Pa., for the Pittsburgh territory.

Link-Belt., Ltd., has recently opened a branch office in the Standard Bank Building, 510 West Hastings St., Vancouver, B. C., with Frank B. Wetherill in charge, with the aim to supplement the service rendered by Fleck Bros., Ltd., Canadian Fairbanks-Morse Co., Ltd., and A. R. Williams Machinery Co., Ltd., who will continue as official distributors of Link-Belt chain and other products.

Goodall Rubber Co., Philadelphia, Pa., has recently opened a branch at 1431 West Ninth St., Cleveland, Ohio. T. S. Stewart, who has been associated with the mechanical rubber business for several years, is in charge.

Hercules Powder Co., Wilmington, Del., has announced the transfer of William S. Magill, formerly Manager of the Chattanooga office of the Hercules Powder Co., to the Contractors' Division, Explosives Department. Mr. Magill will make his headquarters at 1773 Railway Exchange Bldg., St. Louis, Mo.

Heltzel Steel Form & Iron Co., Warren, Ohio, has announced the appointment of the following new representatives: Stuart M. Christhilf & Co., 205 Snow Bldg., Baltimore, Md.; J. B. Harbison Equipment Co., 209 Spring St., Little Rock, Ark.; Hudson Supply & Equipment Co., Seventh & T Sts., N. E., Washington, D. C.; Kratz & McClelland, Inc., 522 Bryant St., San Francisco, Calif.; Banks-Miller Supply Co., Huntington, W. Va.; Crook Co., 1220 South Grand Ave., Los Angeles, Calif.; C. H. Jones Co., 134-140 Pierpont Ave., Salt Lake City, Utah; and Waterhouse Equipment Co., Inc., Jackson, Miss.

Wallace W. DuPre, Sales Manager, Knickerbocker Co., Jackson, Mich., has purchased a substantial interest in the business of Thomas Brown, Inc., Baltimore, Md., and Washington, D. C., distributors of Knickerbocker concrete, mortar and plaster mixers, Keystone power shovels and Marlo pumps, and will make his headquarters in Baltimore. Mr. DuPre will also retain his interest in the Knickerbocker Co., will remain its Vice President and give his general attention to the company's eastern sales.

Max A. Berns, Publicity Manager, Universal Atlas Cement Co., subsidiary of the United States Steel Corp., was recently re-elected Chairman of the Advertising Coun-

cil of the Chicago Association of Commerce. Mr. Berns, who has been associated for 16 years with the Universal Portland Cement Co., with which the Atlas Portland Cement Co., recently joined, is a member of the executive committee of the Chicago Association of Commerce, of the general publicity committee of the Association, a director of the Chicago Better Business Bureau and a member of the advertising committee of the United States Steel Corp.

The Morris Machine Works, Baldswinville, N. Y., has announced the removal of its Chicago office to Room 716, Builders Bldg., 228 North La Salle St., Chicago, Ill. The new office will be in charge of F. S. Salchenberger.

The Stanley Electric Tool Co., New Britain, Conn., a subsidiary of the Stanley Works, is now manufacturing and selling a complete line of electrically operated hand tools, including drills, screw drivers, bench grinders, aerial grinders, wood saws, stone saws, hammers and sheet metal cutting tools. The personnel of the company is L. M. Knouse, President; Cedric Powers, Vice President in Charge of Production; H. W. Blackman, Secretary; L. W. Young, Treasurer; R. W. Chamberlain, Sales Manager.

The American Institute of Quantity Surveyors will hold its fifth annual convention in St. Louis, Mo., on April 14-16.

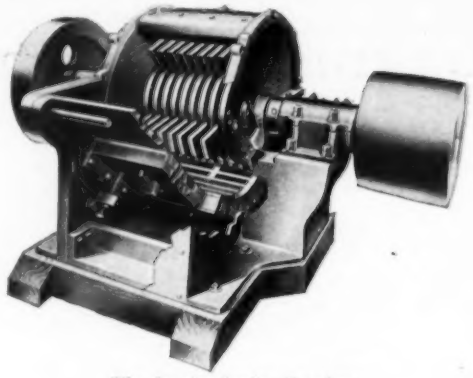
LaFrance Republic Sales Corp., Alma, Mich., states that there was a rumor at Atlantic City during the Road Show that the Linn Mfg. Corp., was interested in or associated with the Ace shovel. Walter P. Hanson, Advertising Manager, Linn Mfg. Corp., Division of the LaFrance Republic Sales Corp., has issued the following statement: "With the delightful cooperative relations that have existed between the manufacturers of power shovels and ourselves as manufacturers of transportation units with these shovels, we wish to inform you definitely that there is no foundation whatsoever for this rumor and our officers inform me that there is not the slightest contemplation of any such connection either with this particular shovel company or any other."

The Portland Cement Assn., 33 West Grand Ave., Chicago, Ill., has announced the appointment of Walter R. Macatee as District Manager in charge of Association work in Virginia and North Carolina. His offices will be at 904 East Main St., Richmond, Va.

A Crusher for One-Man Size Stone

THE Jumbo Junior crusher, among the features of which are ability to handle one-man size rock, stone as large as 100 pounds and ease of adjustment for size of finished products, is manufactured by the Williams Patent Crusher & Pulverizer Co., 2701-23 North Broadway, St. Louis, Mo. This crusher is used extensively to crush both quarry run rock and screen rejects, reducing them to 2½ inches, 1¼ inches or smaller, particularly for use as macadam or concrete rock. With a different adjustment, the Jumbo Junior reduces stone to agricultural limestone in one operation.

The weight and type of the hammers on this crusher vary with the work to be done. In the crushing of limestone three rows of hammers are used. Each of these hammers weighs 24 pounds and strikes a 2-ton blow when the machine is in operation. A heavy breaker plate bears the brunt of the crushing. It is a heavy block 3 inches thick of durable material held in place by a lug and wedge arrangement, making it easy to replace when worn. The front end which holds the breaker plate is pivoted at the top and adjustable below permitting the breaker plate to be moved toward or away from the hammers as an adjustment for the size of the product and to regulate wear. The discs which hold the hammers are



The Jumbo Junior Crusher

provided with a series of adjusting holes permitting the hammers to be set out as they wear on the end. The grates which control the size of the finished product are made in sections which are easily and quickly changed by lifting the cover, sliding out one grate and inserting another.

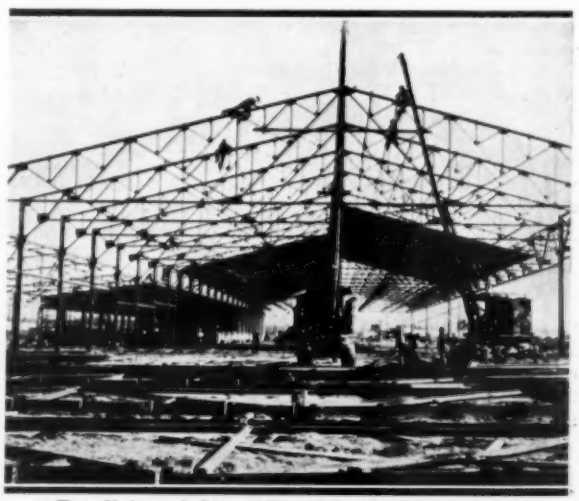
Standard equipment includes dynamo type ring oiling bearings, although heavy duty roller bearings may be furnished if desired. The crusher may also be equipped with a patent dust hopper which prevents the escape of dust and chips from the mouth of the crusher.

Improvements in Gas Road Rollers

THE Huber Mfg. Co., 330 East Center St., Marion, Ohio, has announced several improvements in its 4-cylinder motor rollers, particularly with respect to the scarifier attachment. The rollers are now equipped with a reinforced bar for the scarifier teeth and the teeth may be removed with a bar and spring plunger without removing bolts and clamps.

The roller is also equipped with a wheel instead of a shoe to hold the depth of the teeth. This minimizes the wear and makes replacement unnecessary.

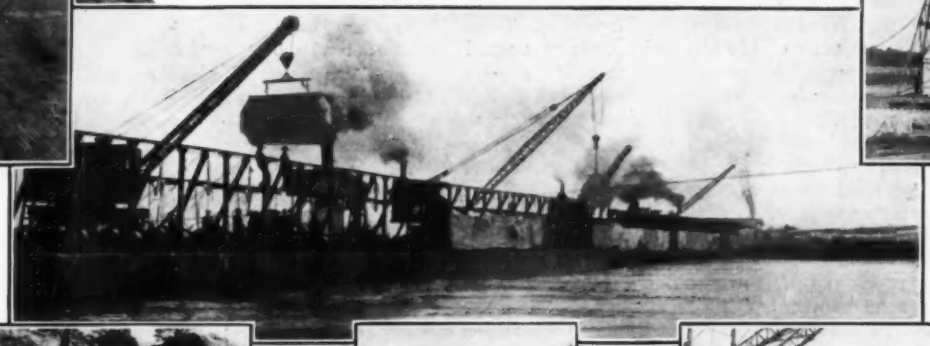
A locomotive valve is installed on the air line, making control of the scarifier easier for the operator. A one-piece steel casting assembly is used for raising and lowering the scarifier bar.



Two Universal Cranes Owned by the Western Crane Service Corp., Equipped with Temporary Timber Extensions Setting 100-Foot Trusses on the Grand Central Terminal Airplane Hangar at Los Angeles. The All-Metal Hangars, 100 Feet Wide, Were Erected at a Cost of $1.10 Per Square Foot

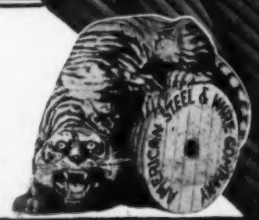
The Best Equipment Demands AMERICAN STEEL & WIRE COMPANY WIRE ROPE

On Mississippi River Levee Work



Construction of the Mississippi River Levee system has called into play practically all known methods of dirt moving, such as draglines, hydraulic dredges, tower machines, etc. On this project all types of equipment are being subjected to gruelling punishment and abnormal operating conditions. And—sharing in this responsibility is American Steel & Wire Company American Wire Rope.

Our wire rope engineers have designed special ropes to fit in with the difficult tasks encountered here. They can help solve your wire rope problems.



American Steel & Wire Company

SUBSIDIARY UNITED STATES STEEL CORPORATION

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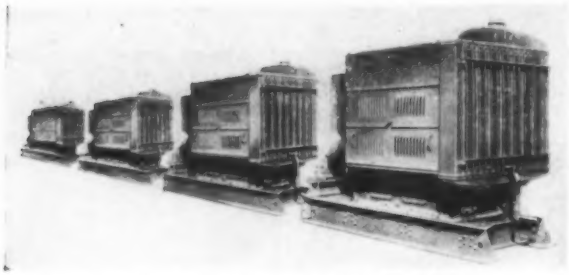


Four Buda-M. A. N. Diesels Which Were Put to Use on Highway Construction in New Mexico

New Large Diesels for Highway Work

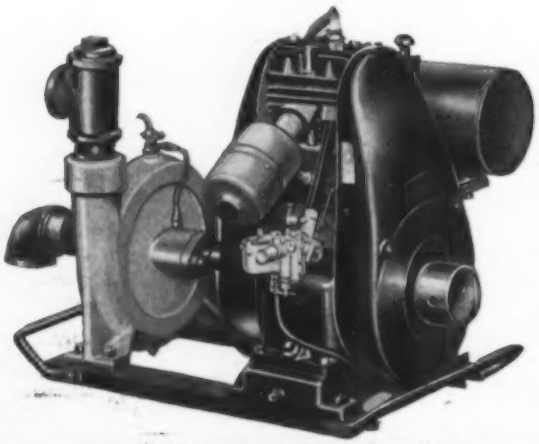
FOUR new large Model D4-30 Buda-M. A. N. diesel engines for use on highway construction have recently been manufactured by the Buda Co., Harvey, Ill. These units develop a maximum of 120 bhp and operate at a speed of 800 to 1,000 rpm. The engines are mounted on skids which enables them to be moved from one job to another with a minimum of effort. They are completely enclosed with sheet metal housing which is equipped with a padlock to prevent tampering with the engine when it is not in use.

The radiator is of the automotive type, made in sections, any one of which may be removed and replaced without serious interruption of the work of the engine. These units are fitted with an outboard bearing and paper belt pulley. The clutch is of the disc type, totally enclosed in bell type housing.

Starting is handled by means of a small 2-cylinder air-cooled gasoline engine, which is mounted on the flywheel housing and starts the diesel through a special Bendix drive. This makes the unit complete and self-contained.

Portable Pump Capable of Handling Up to 8,250 Gallons Per Hour

A LIGHT, compact portable pump for use in draining cellars, trenches, catch basins, conduit manholes, cofferdams, quarries and similar work, is manufactured by the Union Iron Works, Inc., Hoboken, N. J. This pump, which is known as Unipump, is built in two sizes with capacities up to 8,250 gallons per hour. It is the centrifugal, open impeller type, direct-connected, and is made to handle up to 25 per cent of solids without clogging.



The Model 200 Unipump

Model 200, which is illustrated, is powered by a Briggs & Stratton 4-cycle, 1½-horsepower engine, with a speed range up to 2,200 rpm. It is air cooled and equipped with magneto, governor and Tillotson carburetor with an air cleaner.

The base is strong, all steel and electric welded. It is equipped with carrying handles, making it easily portable. The complete unit weighs 180 pounds, with an overall width of 19½ inches, length of 30 inches and height of 22 inches.

Model 150 is powered by a 4-cycle ½-horsepower Briggs & Stratton, and weighs 105 pounds. It is 16½ inches wide, 30½ inches long and 17½ inches high.

An Arc Welded Blast Hole Drill

THE fact that a machine must be exceptionally strong and rigid to drill through rocks in mines and quarries has resulted in the arc welded design of the Armstrong blast hole drill. This machine, used in drilling large diameter powder holes in mines and quarries, is produced by the Armstrong Manufacturing Co., Waterloo, Ia. It was redesigned especially for arc welded construction, and resulted in the elimination of more than one hundred cast iron and steel parts used in constructing its prototype. The welding is done by Stable Arc welders manufactured by the Lincoln Electric Co., Cleveland, Ohio.

A Blast Hole Drill Fabricated of Arc Welded Steel

The main frame and the derrick are constructed entirely by arc welding. No rivets are used in these parts, and only such parts as must be removed are bolted. By the use of the arc welding process it is possible to build weight and strength into the machine where it is needed, for example, in the frame, and at the same time avoid excessive weights in the derrick where rigidity is more important than weight.

In addition to the main frame and derrick many other parts of this machine, including cable reels, gear guards, motor housing, tool box and belt housing, are fabricated of arc welded steel. Greater strength and rigidity, a simpler design and decreased production costs are among the advantages of using arc welded steel in the construction of this machine.

An article comparing steel construction by riveting and arc welding will appear in our April issue.

CHECK these FEATURES

Before You Buy a —28-S You'll Find Them All in the NEW Ransome.

1. Lower Overhead Room—Total height is but 8'-0 7/8" to top of the batch hopper. ✓

2. Drum Rollers—genuine car wheel metal with chilled face and flange. Timken Roller Bearings. ✓

3. Drum—all steel construction—large radius corners. Mixing blades equipped with high-carbon steel renewable liners. ✓

4. Discharge—8 to 10 seconds. And that is *speed!* Power discharge is standard. ✓

5. Accurate and Rapid Water Control—One turn of the control wheel changes from the maximum to the minimum that can be discharged from the tank. This change can be made instantly and no locking device is needed on the wheel. ✓

It is impossible to by-pass any water through the poppet valves used only on the Ransome 28-S. ✓

6. Lubrication—Alemite throughout. ✓

Bulletin 124 tells the whole story. Send for your copy today—or ask any Ransome distributor for one.

Ransome Concrete Machinery Company

1850—Service for 80 Years—1930

Dunellen **New Jersey**

The New Mack 6-Cylinder Model BC

A New 6-Cylinder Motor Truck

TO the fields where diversified hauling requirements demand power, capacity and high safe speed, the new Mack 6-cylinder Model BC motor truck made by Mack Trucks, Inc., 25 Broadway, New York, brings a margin of earning capacity and flexibility. This new model does not supplant an existing Mack model. Over long distances, it will take a full pay load at a sustained speed to meet the most exacting requirements and its 90-horsepower engine assures the power and acceleration so essential to efficiency in maintaining schedules.

This model has a seven-bearing crankshaft, drop forged and case hardened and counterbalanced with separate counterweights. All main bearings are 3 inches in diameter. The camshaft is mounted in four bearings and is 1¼ inches in diameter, the valves being at the right side and having flat seats.

The six cylinders of the engine are cast en bloc with demountable head cast in one piece. The engine has a 3¾-inch by 5½-inch bore and stroke and offset high compression chambers. The pistons are of aluminum alloy and the drop-forged steel connecting rods are tubular. Ignition is by battery distributor with semi-automatic advance. A cold circulation type bypass is incorporated in the cooling system set to close at 150 degrees and open at 175 degrees. The clutch is of the Mack single-plate, dry type, with the clutch housing and transmission bolted to the crankcase to form a unit power plant. The combined fan and water pump are mounted on the front of the cylinder block. Among the other interesting features of this engine are crankcase ventilation, throttle-controlled exhaust heat and the high-pressure oiling system. This engine will develop 110 horsepower at 2,400 rpm giving power at reasonable engine speed.

The chassis is rugged in construction, the final drive being the Mack dual reduction type with inclined banjo-type axle and full-floating shafts, the center support carrying the drive-shaft hand brake assembly. The gas tank is located under the seat with filler spout and gage at the right side of the cab. Mack rubber shock insulation has been used extensively throughout this model, all springs as well as the radiator and cab being mounted in blocks of live, resilient rubber. The bottleneck plant at the front of the frame and the centerpoint steering allow for an unusually short turning circle.

Four wheel internal brakes operated mechanically with a vacuum booster give an important factor of safety.

An All-Steel, Three-Speed Road Roller

THE Hercules 10 to 12-ton road roller which is of steel construction throughout, extra heavy and oversize in parts and sufficiently rugged to withstand the service for which it is designed, has recently been developed by the Hercules Co., subsidiary of Osgood Co., Marion, Ohio.

The frame of the roller is constructed of steel, of extra heavy steel plates 48 inches wide, reinforced with heavy continuous steel angles and a number of steel cross members, all hydraulically riveted. The plates and angles extend the entire length of the frame, the forward ends of the side plates being riveted to the front end alloy steel casting in which the king post is carried. The alloy cast steel transmission-differential case or housing sets between the two side plates and forms a brace between the plates. The rear end of the frame is reinforced to distribute and absorb throughout the frame any strain from towing equipment or dragging a scarifier.

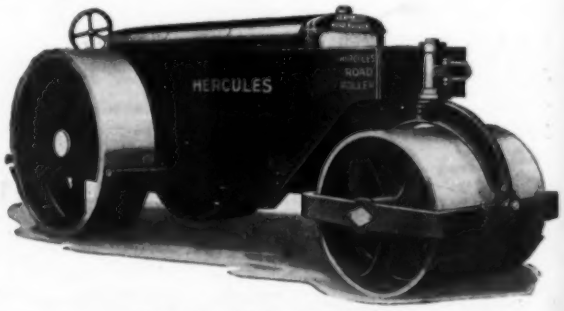
The carriage carrying the front rolls and steering the roller, made of steel castings, is of the gyroscopic type and consists of the king post, yoke, roller frame, axle and front rollers. Each front roller is 44 inches in diameter with a 22-inch face. They are placed side by side on a 3½-inch shaft, forming a continuous drum with a 44-inch face. Each roller revolves independently of the other, thus facilitating steering. Scrapers front and rear have adjustable blades with compression springs permitting any desired tension on the scraper blades, which are fitted below the center line of the front rollers to remove any adhering material before it has time to pile up on the roller frame.

The rear rolls are 68 inches in diameter and with a 20-inch face. Cast integral with these rolls are the service brake drums. The face of the rim of these rolls is tapered to give the right contour or crown to the finished road. Reamed taper holes are provided to receive picks. Plugs are furnished for closing these holes when the picks are not in use.

The steering mechanism consists of a hand wheel at the right of the operator's cab and a shaft extending to the bevel gears mounted upon the steering worm shaft. Power steering can be provided when specified. The power steering drive is direct through metal to metal clutches with the gears and clutches in a dust-proof case and operating in oil. All controls are conveniently located in the operator's cab. There is one lever for forward and reverse, one for stopping or starting the roller in either direction, one for each change of speed, one for locking the differential, a braking foot pedal and a brake wheel and an ignition switch, starter switch and lighting switch located on the dashboard.

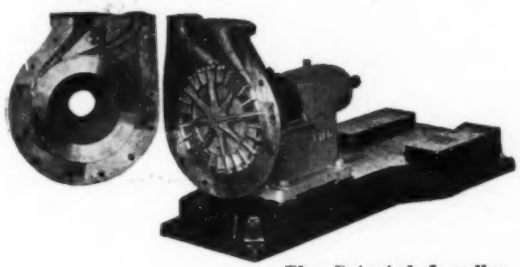
The motor is of the heavy duty type with 6 cylinders, a 4½-inch bore and 4¾-inch stroke and develops 60 horsepower at 1,100 rpm. A Pierce governor permits a variable speed range either above or below standard speed. An oversize radiator provides ample water for cooling.

The Hercules is provided with two sets of brakes, service and emergency. One system operates upon a steel drum in the transmission through the medium of bronze shoes. The other system consists of a large wide steel drum cast integral on each rear roll and having an approved brake lining on an external contracting band brake operating through a brake equalizer. These brakes effectively prevent the roller from getting away on a grade and dispense with the necessity of blocking when working on hills, as well as facilitating the stopping and reversing required by road work.



The New All-Steel Road Roller

No floats, No valves—One Pump Handling both air and water



The Patented Impeller is the only moving part.

Fast melting snows and drenching rains of early spring present no water removal complications to contractors equipped with LaBour Contractors Pumps. Whether the water seepage is continuous or intermittent, LaBour Pumps can be counted upon to perform with efficiency and economy, lifting both air and water from below the pump—*without priming.*

There is only one moving part in a LaBour Pump—the patented impeller—so ruggedly constructed of alloy steel and built with sufficient clearance that it will handle sandy, gravel-laden water without clogging.

Once a LaBour Pump is started it will run continuously with no superintendence except an occasional oiling. In either portable or stationary installations LaBour Pumps can be furnished with capacities up to 1,000 gallons per minute.

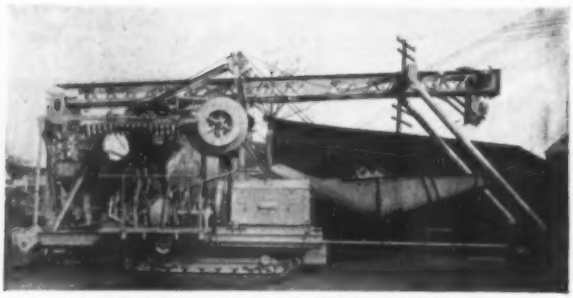
Bulletin No. 31 contains many interesting facts about LaBour Pumps. Write for it today.

Write for Bulletin

THE LABOUR COMPANY, INC.
ELKHART, INDIANA

LA BOUR PUMPS

NEVER LAY DOWN ON THE JOB



The 27-E Paver Unit with Mast Folded Down

A 27-E Paver With Mast Plant

A PORTABLE concrete mixing and placing unit for pouring concrete into retaining walls and other structures which are long, some distance apart and several feet above the ground has been developed by the Ransome Concrete Machinery Co., Dunellen, N. J. This plant consists of a 27-E paving mixer with a steel mast and bucket and hoist, as one complete unit.

An outstanding feature of this unit is that the mast is hinged and can be folded down to travel under telephone wires, bridges, or when traveling any great distance. To raise or lower the mast the paver loading skip is used, making the operation simple and speedy. After the mast is raised to vertical position the same pipe struts are detached from the skip and fastened to the paver frame, making the unit entirely self-supporting without the use of guys. A set of folding jacks are used only when operating. At all other times they are folded out of the way.

Concrete is raised in a hoist bucket of 1-yard capacity. The hoist for raising the bucket is attached to the paver and is driven from the paver power plant. The control levers for the hoist and brake are located so that one man standing on the regular operator's platform can operate the mixer and the mast bucket. The method of distributing concrete is by a boom chute plant equipped with a counterweight chute. The lower end of the counterweight chute can easily be shifted along the forms. If chuting is not desired, the concrete can be discharged into a floor hopper and carted.

This unit as illustrated is well balanced and compact which makes it easy to operate and maneuver about the job. The complete mast attachment can be taken off and a standard boom and bucket installed for regular road work.

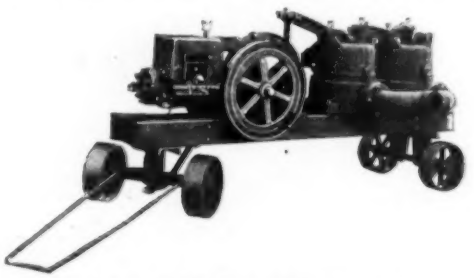
The Plant in Action Pouring a Wall

A Double Diaphragm Trench Pumping Outfit

FOR speedy handling of large quantities of dirty, gritty water, Nelson Bros. Co., Saginaw, Mich., has developed the Jumbo double-diaphragm trench pumping outfit. This pumping outfit is built as an individual power unit and can do the work of 24 men and 12 hand pumps.

The pump is designed for power drive and constructed to withstand hard service. The diaphragm is made of the best quality rubber. The suction valve is of metal, rubber faced and easily removed. It is set on an incline seat, thus offering the least obstruction to the passage of semi-liquid or solid matter. The lever operating the diaphragm is so designed as to lift the diaphragm vertically, thus eliminating the side motion that would tend to shorten its life and consume power.

The jack is simple in design but strong in construction. A strong box type frame carries a 1¼-inch crankshaft of drop forged steel having a 5-inch throw. The bearings are removable die castings 2½ inches long. The connecting rod is of malleable iron, with a die-cast bearing at the large end and removable bronze bushing at the small end. The large machine-cut gear is 21.6 inches in diameter, has a 1¾-inch face and is



A Double Diaphragm Pumping Outfit

equipped with a gear guard. The power lever or rocker arm is attached to the pump by large hardened and ground pins, and removable phosphor bronze bushings form the bearings for these pins. The jack gives 65 strokes per minute with the 1¾-horsepower engine and 70 strokes with the 3-horsepower engine.

With outfits Nos. 113, 114 and 123 the standard 1¾-horsepower Jumbo engine is used. This has a normal speed of 500 rpm and is equipped with a speed regulator by which the speed can be varied 100 rpm while the engine is operating. With outfits Nos. 313, 314, 323 and 324 the Jumbo 3-horsepower is used. It has a speed of 450 rpm which can be varied 75 rpm while the engine is running.

The suction lift on these outfits ranges from 20 feet to a maximum of 25 feet under favorable conditions. The average overall height is 28 to 30 inches. The engine and pump are securely bolted to a rigid channel steel base, designed to secure a compact vibrationless unit.

Statistical Study of Highway Facts

A STATISTICAL story of the growth of the highway systems in the United States and the world is told in the Highways Handbook, a recent illustrated publication brought out by the Highway Education Board.

Data and information used in the booklet are from government tabulations, the United States Bureau of Public Roads and the automotive division of the Bureau of Foreign and Domestic Commerce being the principle sources. The 97 pages of the handbook, the first comprehensive grouping of highway statistics into one volume, are divided into ten chapters, each treating a different phase of the subject.

One chapter is devoted to a general summary and other topics covered include Federal Aid, state and county programs, finance, world mileage and bibliography.

Makes a little

ROAD MONEY

work like a LOT

No development of recent years has so universally appealed to highway officials as Tarvia "Re-Tread."

No elaborate organization or expense equipment is necessary to do a perfect job with "Re-Tread." A skid-safe, easy-riding, durable road surface that compares favorably with any type of pavement can be built on short notice and at exceedingly low cost.

Tarvia "Re-Tread" is a mixed-in-place combination of crushed stone, slag or crushed gravel and a special Tarvia developed particularly for this method. On any strong road base, new or old, "Re-Tread" provides a pavement that is completely satisfactory to road officials, taxpayers and motorists.

The Tarvia field man will gladly tell you more about "Re-Tread." Phone, wire or write to our nearest office.

Tarvia "RE-TREAD"

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A New Truck Mixer for Mortar and Concrete

A NEW truck mixer, known as the Stepanian truck mixer, has been developed by Stephen Stepanian, Vice President of the Arrow Sand & Gravel Co., Columbus, Ohio. This machine, although designed as a truck mixer, can be used also for transporting ready-mixed concrete, ready-mixed mortar, sand and gravel, crushed stone and can also mix building mortar.

The mixer consists of a drum with a short cylindrical center section and frustrum ends supported on a frame-work of structural steel shapes. The design of the mixer is such that no heavy cumbersome structure is required. The mixing blades are self-cleaning and have a figure eight motion. The drum is water, air and steam tight, the latter being a special advantage when hauling hot concrete for winter construction. The water tank, which is easily connected or detached, does not add any extra height to the unit and the water is applied by gravity at both ends of the cone at a point above the mass in the mixer. This not only insures a rapid and uniform mix but a free flow of water as well. The mixer fits any standard truck, all of the unit being above the chassis frame, and the entire unit is fastened to the chassis by four bolts.

The Truck Mixer with the Conveyor at a Low Angle and the Discharge Chute Folded Underneath the Conveyor as It Would Travel on the Road

The mixer is loaded at the top direct from the bin gates through a specially designed rack and pinion gate with roller bearings. This is 12 inches wide and 34 inches long, allowing rapid loading or discharge and rendering the interior of the drum easily accessible for cleaning, inspection or repair. The open top loading eliminates any necessity of premixing the aggregates by means of special loading equipment and the drum does not revolve as the mixer is being charged.

To unload, the drum is turned until the gate is at the bottom. The material discharges onto an 8-foot belt conveyor with a capacity of 2 cubic yards per minute and adjustable to discharge at different heights up to 7 feet. A swinging chute at the end of the conveyor allows the concrete to be deposited within a radius of 7 feet from this point. This chute folds underneath the conveyor when not in use or when in transit.

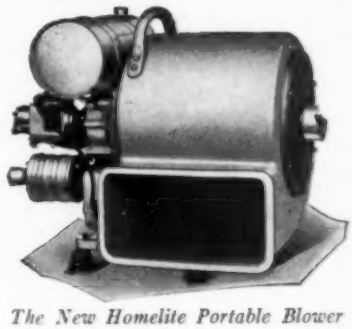
Both the agitator and the conveyor are driven from the truck power plant by direct, chain, multiple V-belt or gear drive as desired. The drive is mechanically simple and no special clutch is required as the gears are always in mesh. A single lever in the truck cab operates all the mechanism. When pushed one way it operates the mixer and in the opposite position operates the belt conveyor.

The rate of discharge of the concrete can be accurately controlled. The conveyor can be operated when the truck is in motion and its speed can be regulated by speeding up or slowing down the motor. This feature, together with the pivoted discharge chute, makes a flexible combination for all kinds of concrete placing.

The mixer is made in a 2½-yard size and is mounted on a 3½-ton truck chassis, having a total loaded weight of 12 tons. A maximum of 10 horsepower is required to operate the mixer.

A New Portable Blower

A NEW portable blower which is adaptable to a number of uses and is of particular interest to contractors is manufactured by the Homelite Co., 71 Riverdale Ave., Port Chester, N. Y. This blower has a capacity of 7,000 cubic feet per minute, is portable with one hand and is powered by a built-in air-cooled gasoline engine.



The New Homelite Portable Blower

It is built to stand up under hard service. Its light weight of 70 pounds has been secured by the use of light aluminum alloy. It has oversize ball bearings on the main shaft and a high grade water-proof magneto.

Contractors find this blower especially useful in ventilating buildings or in conjunction with salamanders for blowing air through buildings under construction to dry the plaster.

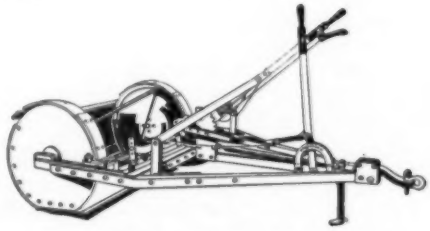
An Automatic Revolving Scraper

THE Wiard automatic revolving scraper, a three-in-one tool for excavating, grading and spreading, is manufactured by the Wiard Plow Co., Batavia, N .Y. This scraper is constructed of specially selected material of sufficient weight and strength to withstand the strain to which it is subjected with the use of modern high powered tractors, trucks and other motive power. It is made in two sizes, 4 and 5 feet, weighing 750 and 1,000 pounds, respectively.

The 4-foot size carries ½-cubic yard, and with the extension back will carry ¾-cubic yard. The 5-foot size carries 1 cubic yard, and with the extension back will carry 37 cubic feet. Broken stones, brick, slag and similar material are moved with equal facility.

Both the scraper and tractor are handled by one operator, with lever and trip within his reach at all times. The scraper has a continuous forward motion when scraping, excavating or spreading, but will revolve backward against a wall in cellar digging and will slide backward to dump its load over an embankment.

The positive excavation control is operated in accordance with the type of work to be done and the character of the material to be handled. Control is flexible and may be set to fill the bowl in 3½ feet or to skim the surface. When the bowl is full it automatically moves into carrying position and the blade rides clear of the ground. The load may be dumped accurately at any point desired, either in a heap or spread to any required depth, or banked and dumped over an embankment or into trenches or ditches. As an excavator it handles wet soil and sticky clay cleanly and quickly and digs in on hard ground.



A Wiard Automatic Revolving Scraper

WELDED STEEL FABRIC, JOINTS, FORMS AND CURB BARS

Insure Rapid and Accurate Modern Road Construction

WELDED STEEL FABRIC
AIR-CUSHION EXPANSION-JOINTS
DOWEL CONTRACTION JOINTS
REINFORCING RODS
ROAD FORMS—CURB BARS

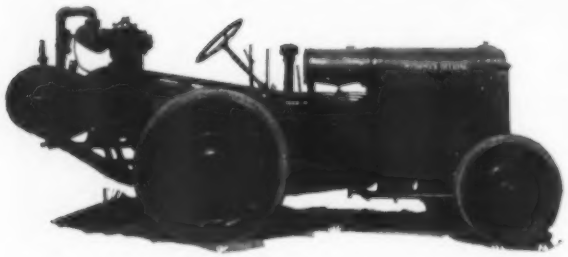
A PRODUCT OF TRUSCON

The development of Truscon Products has kept pace with the great advances in modern concrete road construction. Truscon Welded Steel Fabric is an ideal mesh reinforcement which is easily installed and stays where it is placed. Truscon Dowel Contraction Joints provide definite planes for expansion and interlock the adjoining slabs. Truscon Air-Cushion Expansion-Joints are 100% efficient, allowing the joints to close completely when the pavement expands. Truscon Road Forms insure rapid and accurate construction. Truscon Curb Bars reinforce and protect concrete curbs against shocks and abrasion.

Handbook on Modern Road Construction sent free on request

TRUSCON STEEL COMPANY, YOUNGSTOWN, OHIO
HIGHWAY DIVISION
TRUSCON STEEL COMPANY OF CANADA, LIMITED, WALKERVILLE, ONTARIO
Warehouses and Offices in Principal Cities

Do you mention the CONTRACTORS AND ENGINEERS MONTHLY when writing? Please do.



The Davey Compressor Mounted on a McCormick-Deering Tractor

An Air-Cooled, Tractor-Mounted Air Compressor

THE Davey air-cooled tractor-mounted air compressor which is particularly adapted to highway and street railway construction and maintenance, excavation of tunnels, sewers, ditches, bridge approaches, foundations, maintenance work, digging in frozen ground, demolition, sand-blasting, riveting and general contracting work, is manufactured by the Davey Compressor Co., Kent, Ohio.

The compressor is of the 2-cylinder vertical type, with a 6-inch bore and 6-inch stroke and a speed of 725 rpm. It develops 25 horsepower at 80 pounds pressure and has a capacity of 142 cubic feet per minute, sufficient to operate two rotating jack hammers or cement breakers, four tie tampers or other tools of similar heavy requirements.

The air-cooled construction of this compressor affords a number of advantages. It prevents the freezing and cracking of castings in cold weather, it provides an efficient method of cooling discharge valves and heads and minimizes the care necessary to maintain the equipment in good operating condition. The air coming from the compressor is cooler, increasing the comfort and efficiency of the men operating the tools and adding to the life of the air hose.

This compressor may be easily and readily mounted on a McCormick-Deering 10-20 tractor without changing the tractor construction. Such a unit can travel on the road at 12 miles an hour and does not interfere with the tractor's use for trailing standard loads. The compressor may also be mounted on a Caterpillar Twenty. This makes a unit which can be used in muddy and swampy ground and with which many types of accessory equipment may be used.

An Industrial Crane and Winch for Tractors

AN industrial crane for use with the Caterpillar Thirty tractor which is rugged and so compact that it appears to be part of the tractor itself, is now being made by the B. & A. Specialty Co., 220 East Brady St., Tulsa, Okla. This new unit is known as the Basco winch and boom and consists of a powerful single-drum, all-steel winch with a boom attachment.

A sheave at the end of the boom is 8 feet above the ground and from 4 to 6 feet behind the tractor sprocket shaft. The boom or crane has a stationary lifting capacity of 4,000 pounds. When used as a portable unit to lift and transport loads, its capacity is 2,000 pounds. A feature worthy of special mention is the worm-driven hoisting winch. The use of a worm gear makes it possible to hold the load suspended when the power is released without applying the brake. Two speeds are provided, one forward and one reverse with a neutral point between. A stiffleg or outboard boom support can be supplied for heavy stationary lifts up to 6 tons. A longer boom for higher lifts is also available.

The winch is furnished without the boom attachment, if desired. It develops a bare drum line haul of 25,000 pounds at a speed of 35 feet per minute and is controlled with the tractor master clutch. A positive type clutch is built into the hoist to obtain free spooling of the drum. A brake 4 inches wide and 22 inches in diameter having an effective brake area of 276 square inches is located on the drum flange. Space is provided to spool 500 feet of ⅝-inch cable.

The mounting is unusually high above the draw-bar and so close to the tractor transmission case that the original balance of the tractor is but slightly affected. There is no characteristic of the attachment which would prevent using the tractor for drawbar service.

New Truck Model in 2, 2 ½ and 3-Ton Capacities

A NEW Relay truck model, in 2, 2½ and 3-ton capacities, has recently been announced by the Relay Motors Corp., Lima, Ohio. This model, known as 50D, is built in three wheelbase sizes, 139½ inches, 161 inches and 185 inches. The 139½-inch model is particularly adapted to dump truck operation where a short turning radius is required.

The engine on this new model is the 6-cylinder type, with a 3¾-inch bore, a 5-inch stroke and 330 cubic inch piston displacement. Cylinders and pistons are of grey iron, the cylinder being cast in block and containing steel alloy, thus giving greater resistance against wearing of the cylinders and valve seats. The 50D has a rated horsepower of 33.75. Push rods are of the mushroom type, hardened and ground to a close fit. Lubrication is secured by a forced feed oiling system with connecting rod bearings fed through a drilled passage in the crank shaft from the main bearings. Oil is also delivered to the timing gear compartment.

To meet the demands of all types of service, the 50D transmission has five speeds forward and two in reverse. The transmission, a selective sliding gear type, has gears and shafts of nickel steel heat-treated and ground. The oil level plug is in the side of the transmission.

There are two complete sets of brakes operating independently. The service brakes, of the internal expanding hydraulic type, operate in all four wheels. The hand brake is contracting on the propeller shaft.

One of the outstanding features of this new model truck is the rear axle design. This pendulum suspension design permits the axle to carry the weight of the body and the load like a pendulum at a distance from the center of the wheel, permitting the body and load to move horizontally with respect to the rear wheels. This construction is of particular importance in connection with road irregularities. Any impact to which a road wheel is subjected has a vertical and horizontal factor. As a result of the to and fro motion of the load and the body

Loading a Relay Motor Truck

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G. C. M., Inc.

How Long *Should a* Culvert Last?

Above — GOHI Corrugated Culvert installed near Cookeville, Tenn., in 1909. Still practically perfect after 20 years of service.

GOHI Corrugated Culverts are made of pure Iron-Copper Alloy, which is definitely known to be the longest-lasting culvert metal on the market today.

Easily handled. Installed between sunup and sundown. No repairs. No upkeep.

AN engineer once remarked — "I use Culvert material that will last 2000 years."

We might well ask — Is there any such material? If there is, who can prove it?

If such material could be found — could it give 2000-year practical service?

It is a commonly known fact that, even in the comparatively short span of 15 years, the forces of erosion make tremendous changes where highways and fills have been constructed, frequently making necessary re-location of drains even in less than that short time.

All evidence points conclusively to a minimum life for GOHI Corrugated Culverts of many years in excess of the drainage demands which necessitated the original installation.

During such a period of service, GOHI Corrugated Culverts, through original low first cost, saving in investment, and freedom from upkeep, effect practical economies that far more than offset the value of any claims for longer service, or the highly improbable need for longer service.

GENUINE OPEN HEARTH IRON — GOHI — TRADE MARK — PURE IRON - COPPER ALLOY — REG U.S. PAT. OFF.

(Meet copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.)

Corrugated Culverts

Give Lowest-cost-per-year Service

Specify them for their many practical advantages over the heavier, rigid type. Any of the GOHI Culvert Fabricators listed below can furnish technical service on any culvert installation.

GOHI CULVERT MANUFACTURERS, Inc., Newport, Ky.

Denver Steel & Iron Works Co. Denver, Colo.	**Lincoln Steel and Forge Co.** St. Louis, Mo.	**Roanoke Sales Corp.** Roanoke, Va.	**Tennison Brothers** Texarkana, Ark.
A. N. Eaton, Metal Products Omaha, Nebr.	**The Newport Culvert Co.** Newport, Ky.	**St. Paul Corrugating Co.** St. Paul, Minn.	**Capital City Culvert Co.** Madison, Wis.
Feenaughty Machinery Co. Portland, Oregon	**The Pennsylvania Culvert Co.** Philadelphia, Pa.	**Tennison Brothers** Oklahoma City, Okla.	**Central Culvert Co.** Ottumwa, Iowa

which the pendulum suspension permits, the greater portion of the horizontal impacts and a considerable portion of the vertical reactions, due to hitting a road obstruction or encountering a grade, are absorbed in the Relay suspension before reaching the chassis. This not only decreases the intensity of the road shocks but also reduces their number.

Since the weight of the load and body has a tendency in this axle to keep the pinion directly below the center of the wheel, a balancing of forces occurs as the engine power is applied. As the engine turns the pinion, it has a tendency to roll upward with the ring gear, while the weight of the load tends to hold the pinion swinging upward. At whatever point on the internal gear where the balancing of these forces occur, at this point the road wheel will start rolling.

While the pinion is swinging upward, a pendulum force is developed which as a maximum approximates three times the weight of the truck. This pendulum force acts partly in a downward direction, adding weight to the truck and increasing the traction, and partly in a horizontal direction contributing a greatly propelling force to roll the truck on its way.

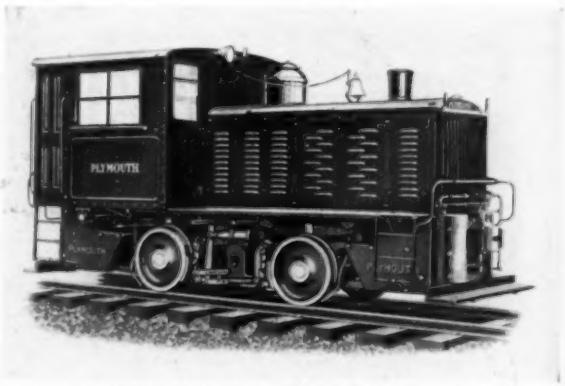
A Double Unit Crushing and Screening Plant

IN view of the fact that many states have specified, or are planning to specify, that road material must pass a ¼-inch screen, the Diamond Iron Works, Inc., Minneapolis, Minn., has developed a crushing and screening unit which combines primary and reduction crushers with a storage bin in one compact portable unit.

This double unit crushing and screening plant consists of an 8 x 36-inch jaw crusher and 22 x 14-inch rolls for reduction. The shaker screen frame carries two screens, the upper with 2-inch perforations and the lower to suit the requirements of the job. All material over 2 inches goes to the primary jaw crusher, all under 2 inches but larger than the perforations of the lower screen is delivered to the roll crusher. By means of these two crushers in a single compact unit, the capacity of a single unit plant has been doubled without increasing operating costs.

Another feature of this crusher is the fact that the entire plant is electrically welded, thus holding the frame firm and in place and eliminating the trouble and wear and tear on the plant caused by loss of rivets.

The complete unit is mounted on wheels equipped with Timken roller bearings, is compact and readily portable and has a capacity of from 200 to 600 yards per day through a ¼-inch screen.



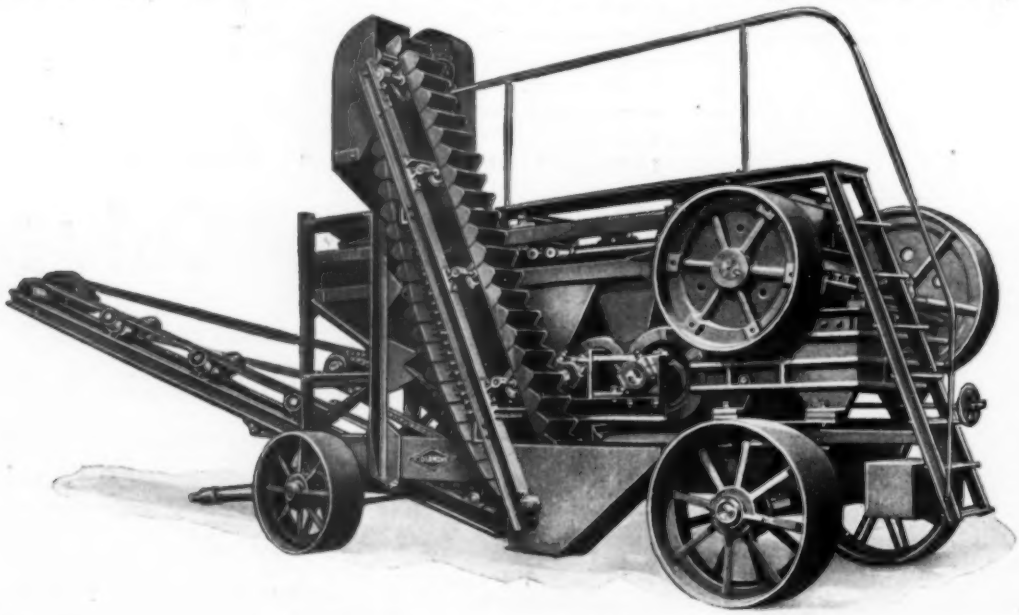
A Model ML6 30-Ton Gasoline Locomotive

New Gasoline Locomotives

A NEW line of gasoline locomotives known as Model ML6 in three sizes, 20, 25 and 30-tons, and Model ML8 in two sizes, 30 and 35 tons, has recently been brought out by the Fate-Root-Heath Co., Plymouth, Ohio. Model ML6 is powered by a 6-cylinder LeRoi engine while the ML8 is equipped with an 8-cylinder V-type LeRoi engine. The latter is particularly useful where speed as well as power is an important factor.

The frame of these locomotives is a bar-steel type of special construction, using equalized semi-elliptic springs. It provides easy accessibility to all parts inside the frame. The springs are long and flexible, 48 inches long and 4½ inches wide.

A new feature of this locomotive is that it is equipped with both side and cross equalizers, giving a true 3-point suspension, so that the locomotive can ride the roughest track with ease.



A Diamond Double Unit Crushing and Screening Plant

SPRINGTIME is FLOOD TIME

High Waters of the Mississippi River in Louisiana

Continuous Chlorination

Will Safeguard Your Water Supply

Every Spring "old man river" starts his annual rampage—dealing death and destruction to the unprepared. With the first thaws of Spring comes his warning! . . . Will you be ready?

Will you be ready to overcome the gross pollution that the flood will bring to your water supply?

Will you be ready with W. & T. apparatus and Liquid Chlorine to destroy the microbes of disease and eliminate the danger of water-borne epidemics?

W. & T. are ready now! . . . Why wait for the flood.

"The Only Safe Water is a Sterilized Water"

W. & T.

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Manufacturers of Chlorine Control Apparatus

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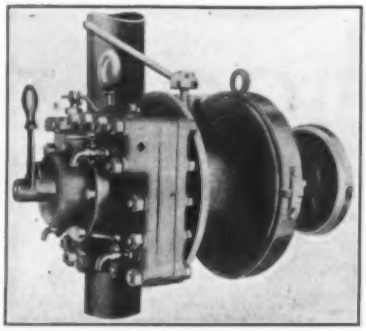
H-6

Two New Single Drum Hoists

TWO new models of the single drum air or steam hoists have recently been developed by the Gardner-Denver Co., Rock Drill Div., Denver, Colo. These hoists have greater capacity than the present models and are known as No. 8 and No. 10.



The New Single Drum Gardner-Denver Hoist

The outstanding features of these two hoists are improved engine design with balanced pistons and air control through balanced spool valves with increased port areas throughout, thus giving greater efficiency and the same power of speed forward or reverse.

All moving parts of these hoists are fully enclosed. The gear sets are enclosed in a dustproof, oil tight case. The brakes are of the post type, operated with a long lever, giving instant application and release. A non-destructive clutch connecting and disengaging the drum from the gear set is easily operated by a lever, and locks positively in either direction. The crankshafts are of heavy forged ground steel and run in ball bearings and all parts are well lubricated.

A New 25-Ton Diesel-Operated Crane

A NEW diesel-operated 25-ton capacity locomotive crane, believed to be the first of this capacity to be powered by a diesel engine, has recently been announced by the Industrial Brownhoist Corp., Cleveland, Ohio. The engine on this new hoist is of the 6-cylinder, 2-cycle solid injection type and burns any grade of fuel oil. The entire operating mechanism is mounted on a one-piece cast steel rotating bed and the side frames are also made of steel castings. The power take-off from the engine is fully enclosed, runs in oil and is equipped with Timken roller bearings to minimize friction and make the crane quiet in operation.

The New Industrial Brownhoist Crane Which Is Diesel-Operated

A New and Powerful Clamshell Bucket

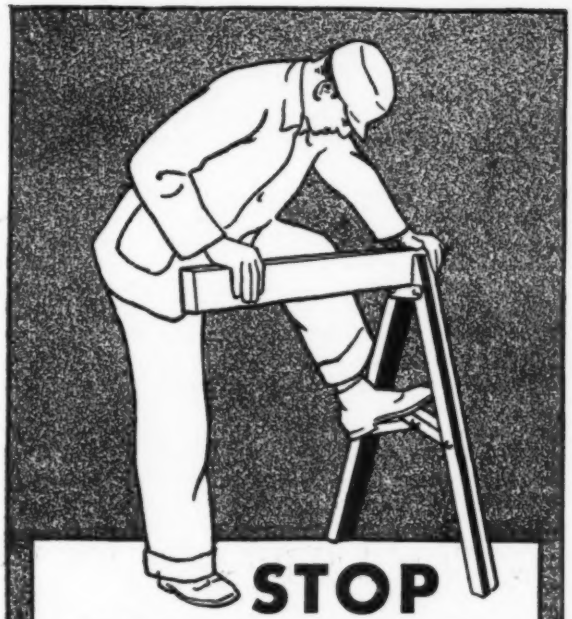
A NEW clamshell bucket, called Multi-Power from its working action which is a combination of two well-known principles, the multiple rope and the lever arm principles, has recently been developed by the Erie Steel Construction Co., Erie, Penna. The multiple rope principle gives power while the lever arm principle contributes speed. This new bucket can be rigged up with 2, 3, 4, 5, or 6 parts of line, giving additional power without sacrificing speed, and making it particularly useful as a bucket for sewer and trench work. Another feature giving it additional speed is its low head room, requiring shorter corner bars and therefore less line to overhaul in opening and closing the bucket.

The New Multi-Power Clamshell Bucket

This Multi-Power bucket is of all steel construction, with few moving parts and large bearings. There are 13-inch diameter sheaves in the head and power arm, insuring longer life in the cables. The rope is reeved so as to have no S bends, eliminating rope wear and cutting down cable cost. Rope guides on the power arm sheave keep the rope in alignment. There are guide rollers on all four sides of the rope in the head, so that no matter what position the bucket is in, there is no chafing of the rope and excessive wear when closing the bucket.

From 200 to 600 pounds of counterweights can be added to the bucket to suit the type of materials to be dug. These weights are in 100-pound units and can easily be added by one man. They are held in place by two bolts and require only a few moments to attach or remove.

Multi-Power buckets are lubricated by force feed system and have an oil reservoir for the power arm bearings. They are made in ½ and ¾-cubic yard capacities.



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Time—Labor—Lumber

Eliminate broken horses, save storage space, save handling costs by using permanent, folding steel horses.

Toledo Horses

The sturdy ribbed steel frame is quickly opened, the jaw fits and grips standard sized lumber used as cross bar, the toggle brace clicks into position and the horse is ready—rigid, strong, indestructible, never needs repairs. Available in 8 heights—18 to 60 ins. Their moderate cost is quickly absorbed by the frequent saving of time and material

Ask your dealer for the genuine TOLEDO Folding Steel Horse

THE TOLEDO PRESSED STEEL CO.
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Manufacturers of the Toledo Torch—the best highway safety light

Save with Steel

"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD"

Beebe Bros. ALL STEEL HAND HOIST TRADE MARK REGISTERED
SEATTLE, U.S.A.

A Compact, General Utility Hoist — for use wherever power is not practical or available.

Capacity 5 Tons Straight Line
Weight 110 lbs.
Two Speeds
4-1 and 24-1
Dimensions
16" x 17" x 13" High
Positive Internal Brake

Net list $80 f. o. b. dealers or warehouse points (except Pacific Coast or foreign). Steel Tail Hold Yokes $4 extra. . . . Steel Truck Attachments $10 extra. Carried in stock by all dealers listed below and also available from them for emergency shipment from warehouse stocks (carried for dealers and export supply) at Seattle, Chicago, Brooklyn, New Orleans and Houston.

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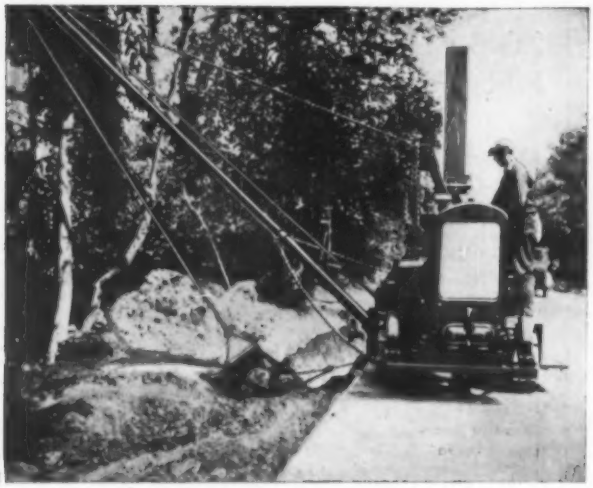


The Cleveland Tamper-Backfiller at Work Backfilling Trench at Edge of Highway

A Handy Machine for Tamping and Backfilling

WITH the large amount of pipe of various kinds being laid along city streets and lining the edges of highways, it has become necessary to provide some means of efficiently and properly replacing excavated earth in the trench so that the excavation does not settle. Many cities and highway departments are requiring that all earth in excavation be tamped and because of this, tamping is being written into many other specifications. A machine which will do this work quickly and economically has been developed by the Cleveland Trencher Co., Cleveland, Ohio, and is known as the Cleveland tamper-backfiller.

This machine is but 58 inches wide, permitting its use almost anywhere. It is mounted on full crawler tracks to enable its use over rough ground and across excavations. Its light weight makes it possible to work over sidewalks and driveways without damage and over soft ground without bogging.

The tamping mechanism can be easily swung and adjusted so as to tamp either at the side or the center of the machine. The usual method is to straddle the trench and tamp in the center, but where obstacles do not permit this method, the boom of the tamper may be swung so as to have the machine run parallel with the trench while tamping at the side. The tamper-backfiller is one-man operated, the operator's platform being so situated as to provide a clear view of the work.

The machine is also equipped with a boom-type backfiller, thus combining the two operations of tamping and backfilling in one compact unit. The backfiller is also one-man operated and can travel ahead uninterruptedly while working.

The total length of this machine is 13 feet 9 inches, its width 5 feet and its height 7 feet 7 inches. It is powered by a 4-cylinder Hercules Model OX motor. The tamping board is 1¾ inches x 9¾ inches x 10 feet and weighs 25 pounds. The tamping and backfilling speeds are 3½, 7 and 11½ feet per minute. Its road speed is 5 miles an hour and its total weight 7,000 pounds.

A One-Man Patrol Grader

A NEW one-man patrol grader, which can be formed by combining a Western No. 32 grader with a McCormick-Deering 10-20 tractor, has been developed by the Austin-Western Road Machinery Co., 400 North Michigan Ave., Chicago, Ill. The combination is easily made by removing a few pieces from the front end of the grader and adding a few attachments, enabling the two machines to operate as a single unit.

Western No. 32 International Grader

In the operation of this new unit, known as the Western No. 32 International, the tractor pulls instead of pushes the blade. The tractor is connected direct to the front end of the blading unit and its weight holds the blade against the reaction of the soil and prevents any skidding of the front end. This construction enables the machine to do effective work in hard material and ditches and permits the use of a longer blade than can be used when the grader is pushed.

This grading unit and attachments may be used with either an industrial or agricultural tractor. The attachment takes but a few moments, involving the removal and addition of only a few pieces. Detachment is equally simple, freeing the tractor for other work when the grader is not in service.

A New Compound for the Preparation of Flexible Concrete

AN asphaltic compound, which when mixed with cement, sand, gravel and water to a mortar-like consistency and trowelled ½-inch deep over any kind of rough, worn or broken floor or over a new concrete base, gives a new wearing surface which is smooth, resilient, acidproof, dustproof and waterproof, has been developed by the Union Products Co., Cleveland, Ohio. This compound, which is known as Lifekote Unicrete, does not depend upon one formula for all floor surfacing work, but the ingredient proportions are changed to meet varying floor and service conditions, specifications for which are worked out in chart form by the manufacturers.

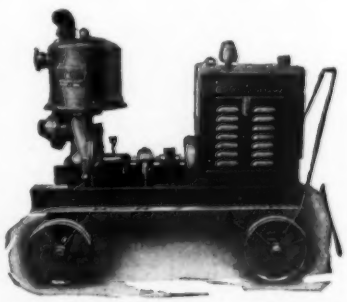
Unicrete may be used for flooring, stair treads, corridors, for loading and shipping docks, industrial plants, sidewalks, driveways, alleys and ramps. It may be used for new floors, for resurfacing old concrete, brick or wood floors and for permanent patches on concrete, and ready for use in 36 hours.

A New Contractors' Pump

A NEW type of self-priming centrifugal pump for contractors' use has recently been developed by Ralph B. Carter Co., Hackensack, N. J. This pump eliminates all priming devices and primes itself continuously and automatically on all suction lifts up to 28 feet.

The pump unit is of the centrifugal type with ball bearing construction, made of the highest grade gray iron casting, with a non-clogging type of three-valve open impeller, allowing the passage of unusually large solids and large percentages of mud and sand through the pump.

These new outfits are mounted on sturdy trucks of both a bolted and welded construction and are equipped with the latest type vertical gasoline engines. They are manufactured in 2, 4 and 6-inch sizes, having capacities up to 1,800 gallons per minute.



The New Self-Priming Centrifugal Pump

Hotstuf
TRADE MARK REG

"Your Heater is Superior in Every Respect"

A strong statement from an Hotstuf user* who knows asphalt heaters. This large and important contracting company have used every known kind and make of asphalt heater. But not until they used an Hotstuf Heater, were they completely satisfied.

Wherever you go, you'll find Hotstuf Heaters doing more and better work for less.

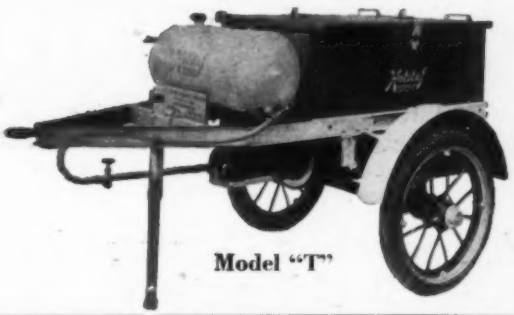
Because of the Hotstuf patented elevated melting shelf, we guarantee at least 30 per cent greater melting capacity with 30 per cent less fuel than any other oil heater on the market.

Write TODAY for Bulletin No. 12. It tells an interesting and convincing story about Hotstuf Equipment.

** We will gladly send you the names of satisfied owners in your locality.*

MOHAWK ASPHALT HEATER CO.

60 Weaver St., Schenectady, N. Y.



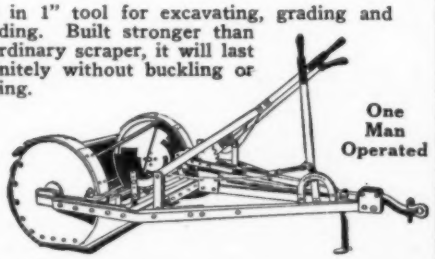
Model "T"

WIARD'S

NEW SCRAPERS AND GRADE-RIPPERS

WIARD'S AUTOMATIC REVOLVING SCRAPER

A "3 in 1" tool for excavating, grading and spreading. Built stronger than the ordinary scraper, it will last indefinitely without buckling or breaking.



One Man Operated

DOUBLE YOUR PROFITS

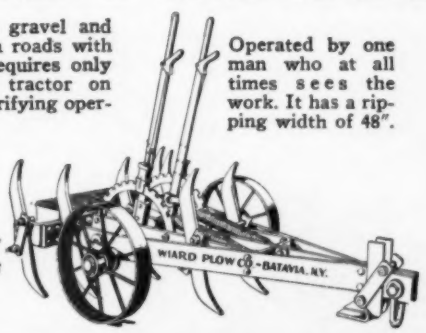
with these new contractors' helpers— they save

MAN POWER — TIME — EQUIPMENT — COST

WIARD'S GRADE-RIPPER SCARIFIER or GANG-ROOTER

Will rip gravel and macadam roads with ease. Requires only a small tractor on light scarifying operations.

Operated by one man who at all times sees the work. It has a ripping width of 48".



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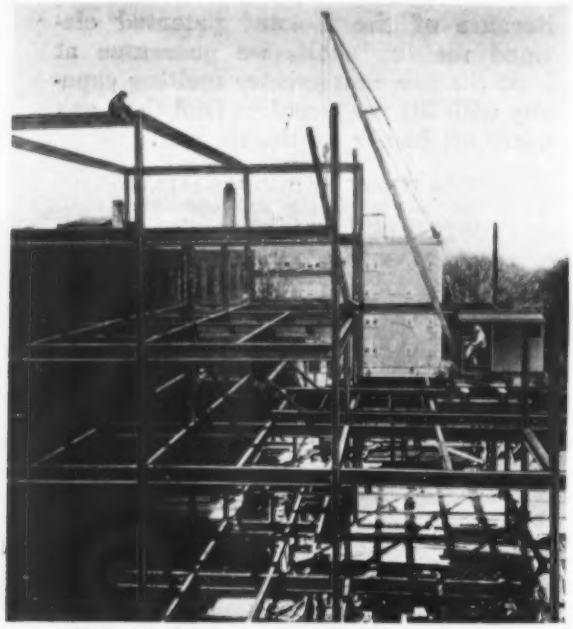
The WIARD PLOW COMPANY

BATAVIA, NEW YORK



A Universal Crane with the New Truck Mounting for Steel Erection

A Traveling Carriage for Steel Erection

A NEW cost-cutting and time-saving means of steel erection and building demolition has been introduced by the Universal Crane Co., Lorain, Ohio, in a special traveling carriage which makes it possible for Universals to be used for steel erection or demolition on buildings of any size and description. For several years there has been an increasing use of Universal motor truck cranes by steel erectors because of their high portability and lower cost over stiffleg derricks. With their long booms and increased capacities, they have been used on three or four-story buildings within the range of 56-foot booms. On building demolition, several contractors have raised cranes on motor trucks to the top of the building, lowering them from floor to floor as the building wrecking progressed.

The special traveling carriage shown in the illustration has been developed, made of structural steel, capable of developing the full capacities of the crane, mounted on wheels which can run on rails laid on top of the structural beams of the building proper. Since the center to center dimensions of columns vary, the traveling carriage is telescopic so that the wheels can be made to fit rail gages varying from 15 to 20 feet. Thus, by laying rails on the building beams and raising the crane and mounting up into the building, the crane can work straight through on one bay, extending the rails ahead of it as necessary. The crane can also set two or three bays on each side as it works its way through.

In order to make it possible to move the unit to another bay, transverse wheels at right angles to the first wheels are furnished. By means of large jack screws located in the traveling carriage, the unit is jacked up clear of the rail and transverse rails slipped beneath the transverse wheels. Thus the unit is moved under its own power into the adjoining bay. The longer rails are placed underneath it again and the unit lowered into place on them to work through the next day.

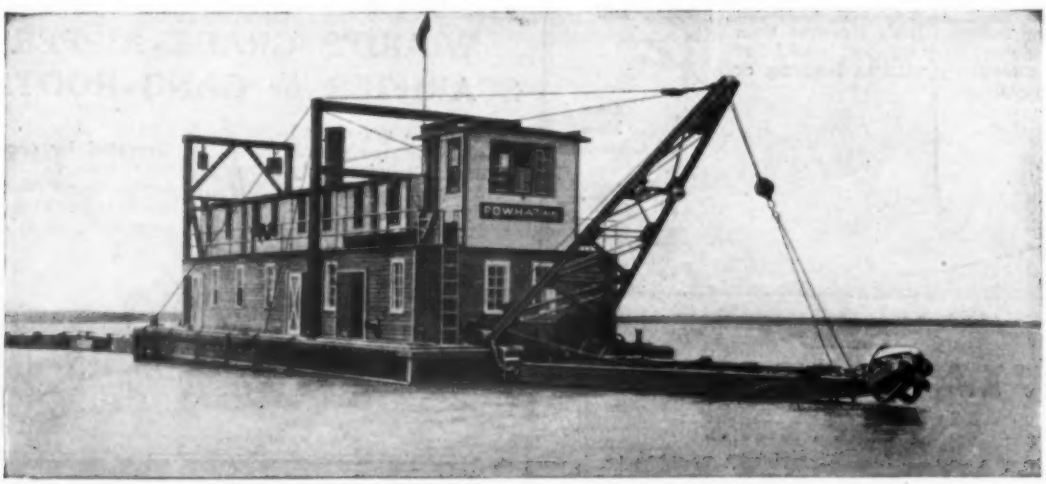
The main rails are mounted on top of I-beams, held to gage by tie rods and separators. These rail girders rest on top of the actual building beams. The width of these girders can be varied from 15 to 20 feet by use of various lengths of tie rods, thus making it possible to use them in a width which insures their bearing on the stringers near the supporting columns and yet being placed sufficiently inside them to afford ample clearance for the crane to travel through between the columns.

Power for propelling the crane unit along the rails is obtained through the crane winches in the subframe. Lines from these winches are reeved through sheaves at the end of the rail girders in a manner to enable the unit to pull itself one way or the other. A special traction drive can be provided as extra equipment, if desired.

The crane used is the standard Universal crane as provided for motor truck mounting. The steel erection traveling carriage mounting is so constructed that the crane unit can be readily lifted off the truck and transferred to the steel mounting and later replaced on the motor truck. Crane booms up to 56 feet can be supplied. A 6-part boom hoist line for accurate boom control on derricking and special cable drums capable of handling 500 feet or more of cable are other crane features that make it especially adaptable and efficient for steel erecting work.

Small Hydraulic Dredging Plant

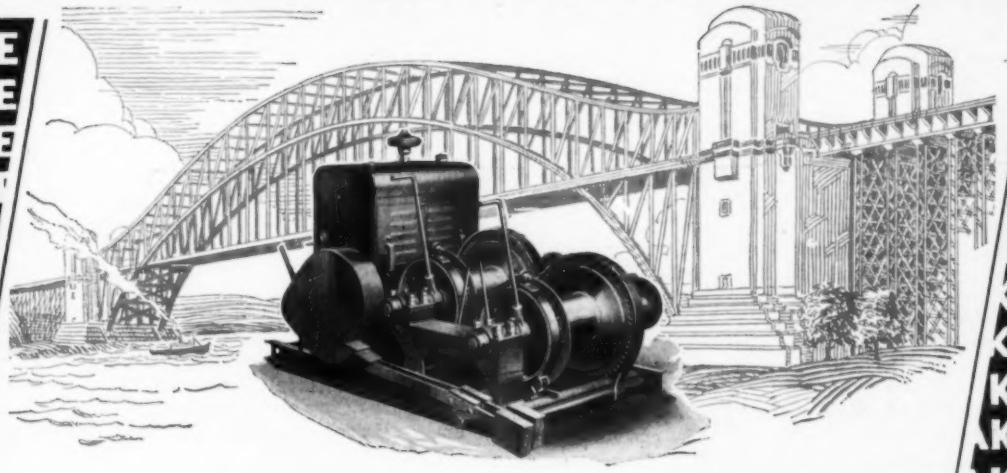
THE demand for waterfront building sites adjacent to navigable water of sufficient depth for small craft has created a distinct field for small hydraulic dredges,



One of the Morris Machine Works Small Hydraulic Dredging Plants

HOISTS DESIGNED ESPECALLY FOR CONTRACTORS

DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE



DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE DAKE

DAKE S-LG HOISTS ARE SUPERBLY STRONG

The famous Hell Gate Bridge which supports a hundred thousand tons of freight every day is constructed almost entirely of structural steel. Now examine a DAKE S-LG Hoist—it too is built of structural steel, built to withstand the most severe tests of actual day after day use.

Combining maximum strength with light weight, they give better and longer service.

DAKE Hoists are powered by either gasoline or electric motors.

It will pay you to examine these DAKE Hoists.

DAKE ENGINE COMPANY

Grand Haven Michigan

PLACING WET CONCRETE
with *Atlas* Portable Belt Conveyors

ON such jobs as paving, bridges, locks, viaducts, buildings, retaining walls, sewers, railway elevations, irrigation ditches.

Built in lengths from 15 feet to 102 feet. Belt widths, 14-, 16-, 18- and 24-inches.

Write for particulars on handling wet concrete from the mixer to the form.

ALSO MANUFACTURERS OF ELEVATORS, UNLOADERS, LOADERS AND TRACTORS

Atlas ENGINEERING COMPANY

Office and Factory

CLINTONVILLE, WISCONSIN

capable of both dredging the channel or bottom and filling in the swamps or low places close to the shoreline and behind low bulkhead.

Dredges for these purposes are usually smaller and different in design and construction from the dredges regularly used for river and harbor improvements. The work is almost always carried out in quiet water where a hull of very simple construction will suffice. Frequently the water is land locked which, on completion of the work, requires that the dredge be dismantled and the hull taken apart before removal to another job is possible. The ability to both dredge and handle material for the fill is of utmost importance on projects of this kind, as such projects usually involve both deepening of the channel and building up of the shoreline.

A thorough study of this class of work, as well as of hydraulic dredging equipment of all kinds has led the Morris Machine Works, Baldwinsville, N. Y., to develop a special line for shore and real estate developments. These small plants embody the good features dictated by 66 years of experience in dredging methods and equipment. The operating parts of the standard dredge consists of a Morris dredging pump, a ladder with revolving cutter, a 5-drum hoist, a priming pump, spuds with guides and lifting tackle, an A-frame with tackle for raising and lowering the cutter and suction inlet line and piping with miscellaneous fittings.

As work of this class is generally located within the range of electric power lines and electric motor drive is simple, compact and most economical, the majority of these dredges are electrically driven. Where current is not obtainable at reasonable cost power from an oil engine or, on very small dredges, from a gasoline engine, will be found entirely suitable and economical. In any instance, ample power should be installed to permit delivery of fair output at the greatest lifts and distances contemplated.

Where the material is of loose formation, such as beach sand and gravel, and the main function of the dredge is the transfer of this material for fill, a less elaborate plant can be used. This type of suction dredge is simple and inexpensive, but is suitable only for working loose deposits where the amount of oversize material is limited. The main equipment on this dredge consists of the Morris dredging pump with suction and discharge lines, a Morris clear-water priming pump, a hoist and the frame and tackle for lowering and raising the suction inlet.

The discharge line between dredge and shore is carried on pontoons and the pipe sections are usually joined with flexible rubber sleeve connections. The line on shore is usually assembled from the pipe sections. The telescopic tapered and hooked ends of the pipe facilitate laying and breaking up the line, and permit of a slight deflection at each joint. The use of light-gage spiral rolled or welded pipe is desirable especially in the shore part of the line because of the ease of shifting it from one location to the other. Elbows or bends in the discharge line should have a long sweep to reduce wear and loss of head.

The size of dredge most suitable for this class of work is from 6 to 15 inches, the most used being 10 and 12 inches. The capacities of the various sizes are rated in cubic yards of solid material delivered per hour and these ratings are commonly as follows:

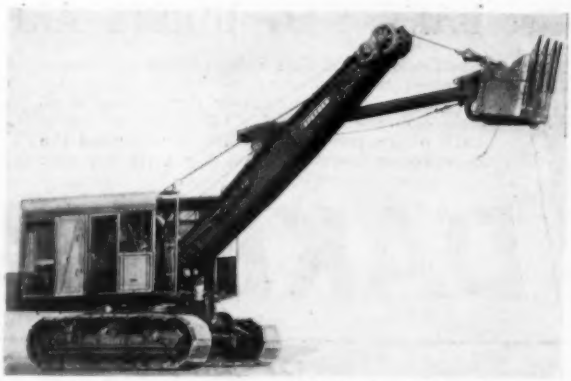
6-inch dredge,	30	cubic	yards	per hour
8-inch dredge,	57	cubic	yards	per hour
10-inch dredge,	87	cubic	yards	per hour
12-inch dredge,	125	cubic	yards	per hour
15-inch dredge,	200	cubic	yards	per hour

A New 1¼-Yard Convertible Shovel

THE new Speeder Model 90, of full 1¼-yard capacity and powered by a gasoline, electric or diesel engine, has recently been developed by the Speeder Machinery Corp., Cedar Rapids, Iowa. This shovel has two working speeds on all operations, drums, travel and swing. Both speeds are direct drives from the power unit and both are actual working speeds, a high speed for shovel work and a medium speed for crane or dragline work. All drive shafts run at relatively high speeds eliminating the pressure ordinarily put on shafts, gears and clutches.

The lower frame of the shovel is a steel casting with machined track with semi-tubular side members closed at the top to exclude dirt. The treads are of extra length, 14 feet 6 inches overall. The turntable is 6 feet 3 inches in diameter and is renewable. Other features of this shovel are Timken bearings throughout, automotive construction, all shafting heat treated and ground to micrometer limits in size, and all gears are cast from special composition steel and machine cut. All bevel gears are heat treated and hardened and the traction bevels run in oil in an oil-tight case. The unit construction allows the removal of drum shafts, vertical shafts, and other parts intact, thus allowing for easy repair and adjustments at any time on the job.

Model 90 has an automatic swing and travel brake, back-geared and purely automatic, which engages as soon as the swing or travel clutches are released. The Speeder reversible drum cable crowd is used. Another feature is the automatic power trip for the bucket which can be released by the pressure of a finger tip.



A Speeder Model 90 1¼-Cubic Yard Shovel

The rear counterweight is instantly adjustable, providing correct ballast for long boom work and giving an adjustable tail swing. The machine has a ground clearance of 17 inches and is 11 feet high from the bottom of the crawlers to the top of the cab.

Line of Engines Extended to 20, 28 and 35 Horsepower Sizes

THE Novo Engine Co., Lansing, Mich., has recently announced that its roller engine line which starts with a 1-horsepower size has been extended to include the 20, 28 and 35-horsepower sizes. Novo has made a feature of these low horsepower engines, using the highest grade of materials and efficient and up-to-date production methods throughout the line, giving an interchangeability of 85 per cent of all parts.

This interchangeability is made possible by the construction feature which gives the same bore, stroke and rpm through the different sizes, as for instance, four sizes have a 3-inch bore or piston, three 3⅜-inch, two 3 3/16-inch and two 3¾-inch. Eight have a 4-inch stroke while five have a 5-inch stroke. The two smallest size engines have a crankshaft speed of 600 rpm while the remaining sizes are all standard at 1,200 rpm.